

EXHIBIT 1

Expert Report of Thomas M. Bryan

Analysis of Registered Voters in Arizona

May 31, 2024

TABLE OF CONTENTS

EXPERT QUALIFICATIONS.....	4
I. SUMMARY AND OPINIONS	7
II. ASSIGNMENT.....	12
III. CVAP and Registered Voter Differences	13
A. Citizen Voting Age Population	13
Table III.A.1 Arizona ACS CVAP Statistics by Vintage: 2017-2021, 2018-2022 and 2022	13
B. EAVS Number of Registered Voters.....	14
Figure III.B.1 2020 Election Administration and Voting Survey Registration Questions	14
Table III.B.1 ACS CVAP by Vintage: 2017-2021, 2018-2022 and 2022 and Total Registered Voters.....	16
IV. Registered Voter Differences from the CPS and CES	17
A. Current Population Survey.....	17
Table IV.A.1 2022 CPS Estimated VAP, CVAP and Registered Voters Table 4B (in millions), Percent Registered and Margins of Error	19
Table IV.A.2 2022 CPS Estimated VAP, CVAP and Voter Turnout Table 4B (in millions), Percent Turnout	20
B. Cooperative Election Study.....	20
Table IV.B.1 Summary of CVAP and Number and Percent of Registered Voters by Source	22
V. REGISTERED VOTER DEATHS.....	24
A. Registered Voters Who Have Been Reported to Have Been Removed From The Arizona Voter Rolls Because Of Death from EAVS.....	24
Figure V.A.1 EAVS Question A9 Voters Removed from the Registration Rolls 2020-2022.....	24

Table V.A.1 2022 EAVS Removal for Arizona, by Reason 25

B. Estimating Adult Citizen Deaths from Total Deaths.....25

Table V.B.1 2020 Life Expectancy and Survival for the US..... 26

C. Analysis of Estimated Registered Voter Deaths.....27

Table V.C.1 Estimated Number of CVAP Decedents December 2020-November 2022 28

Table V.C.2 Total Removals (Any Reason), Voters Removed Because of Death and
Estimated CVAP Deaths..... 29

VI. CONCLUSIONS..... 30

VII. REFERENCES..... 32

VIII. APPENDICES 33

**Appendix 1: Analysis of the impact of calculating voter registration rates using VAP vs.
CVAP, and total registered vs. active registered34**

Table Appendix 1.1 Arizona Percent Registered Voters 36

Table Appendix 1.2 Maricopa County Percent Registered Voters..... 36

Appendix 2: Cooperative Election Study Weight Calculations.....37

**Appendix 3: 2018-2022 ACS VAP and CVAP for Arizona by County Used to Adjust Adult
Deaths downward to Adult Citizen Deaths38**

Appendix 4: Thomas Bryan Vitae.....39

1. I, Thomas Mark Bryan, affirm the conclusions I express in this report and that these opinions are provided to a reasonable degree of professional certainty.

EXPERT QUALIFICATIONS

2. I am an expert in demography with 30 years of experience in demographic consulting and advanced analytic expertise in litigation support, state and local redistricting, and census data. I graduated with a Bachelor of Science in History from Portland State University in 1992 and obtained a Master's Degree in Urban Studies (MUS) from Portland State University in 1996. In 2002, I completed my second graduate degree in Management and Information Systems (MIS) from George Washington University and concurrently earned a Chief Information Officer certification from the General Services Administration. I currently serve on the 2030 Census Advisory Committee.¹
3. My background and experience in demography, census data, and advanced analytics with statistics and population data began in 1996 with an analyst role for the Oregon State Data Center. I continued to accumulate my broad range of experience in 1998 when I began working as a statistician for the U.S. Census Bureau in the Population Division developing population estimates and innovative demographic methods. In 2001, I joined Environmental Systems Research Institute's (ESRI)² Business Information Solutions team where I served as a professional demographer working with Geographic Information Systems (GIS) for population studies. Over the next 20 years, I continued developing extensive cross-industry experience serving in various advanced analytic and leadership roles as a demographer and data scientist for companies such as Altria and Microsoft.
4. In 2001, I founded my consultancy, BryanGeoDemographics (BGD), to meet the expanding demand for advanced analytic expertise in applied demographic research and analysis. My consultancy has broadened to include litigation support, state and local redistricting, school redistricting, and municipal infrastructure initiatives. Since 2001, I have undertaken over 150 such engagements in three broad areas:
 - 1) state and local redistricting,
 - 2) applied demographic studies, and
 - 3) school redistricting and municipal infrastructure analysis.

¹ <https://www.census.gov/newsroom/press-releases/2024/members-2030-census-advisory-committee.html>. My membership on this committee does not constitute an endorsement of BGD or this report by the Committee, the Census Bureau, the Department of Commerce, or the U.S. Government. The views expressed herein are my own and do not represent the views of the Committee, the Census Bureau, the Department of Commerce, or the U.S. Government.

² The global market leader in geographic information system (GIS) software, location intelligence, and mapping, see: <https://www.esri.com/en-us/about/about-esri/overview>

5. My expertise in redistricting began with McKibben Demographics where I provided expert demographic and analytic support in over 120 separate school redistricting projects between 2004 and 2012. During this time, I informally consulted on redistricting projects with Dr. Peter Morrison. In 2012, I formally began performing redistricting analytics, and I continue my collaboration with Dr. Morrison to this day. I have been involved in over 40 significant redistricting projects, serving in roles of increasing responsibility from population and statistical analyses, to report writing, to directly advising and supervising redistricting initiatives. In many of these roles, I performed *Gingles* analyses, risk assessments, and Federal and State Voting Rights Act (VRA) analyses in state and local areas. In each of those cases, I personally built or supervised the building of one or more databases combining demographic data, local geographic data, and election data from sources including the 2000, the 2010, and now the 2020 Decennial Census.
6. In 2012, I began publicly presenting my work at professional conferences. I have presented on the Census, using Census data, measuring effective voting strength, developing demographic accounting models, measuring voting strength and voter registration and turnout statistics. I have also led numerous presentations and tutorials on redistricting. My recent demographic and redistricting work includes:
 - Chairing the “Uses of Census Data and New Analytical Approaches for Redistricting” session at the 2023 Population Association of America meetings in Annapolis, MD.;
 - Chairing the “Population Projections” session at the 2024 Population Association of America meetings, February 2024 (remote conference);
 - Presenting “Uses of Demographic Data and Statistical Information Systems in Redistricting and Litigating Voting Rights Act Cases: Case studies of the CPS and CES, and the ACS and EAVS” at the 2024 Population Association of America Applied Demography Conference, February 2024 (remote conference). The analysis presented at this conference, for another state, is largely reproduced here for the State of Arizona.
 - Accepted presentation “Use of Current Population Survey (CPS) and Cooperative Election Study (CES) in Analyzing Registered Voter Turnout” accepted to be presented at the American Statistical Association Symposium on Data Science and Statistics (SDSS), Richmond, VA.
7. I have been published since 2004. My works include “Population Estimates” and “Internal and Short Distance Migration” in the definitive demographic reference “The Methods and Materials of Demography.” In 2015, I served alongside a team of advanced demographic experts in *Evenwel, et al. v. Texas*. In *Evenwel*, I served in a leadership role in writing an Amicus Brief on the use of the American Community Survey (ACS) in measuring and assessing one person, one vote. In 2019, I co-authored “Redistricting: A Manual for Analysts,

Practitioners, and Citizens,” which provides a comprehensive overview of U.S. Census data and demographic methods for redistricting applications.

8. I have significant expertise in the collection, management, analysis, and reporting of complex demographic, economic, voting, and electoral data, including the American Community Survey Public Use Microdata (or “ACS PUMS” <https://www.census.gov/programs-surveys/acs/microdata.html>), the Current Population Survey Voting Supplement (or “CPS” <https://www.census.gov/topics/public-sector/voting.html>), the Cooperative Election Study (or “CES” <https://cces.gov.harvard.edu/>), the Election Administration and Voting Survey (or “EAVS” <https://www.eac.gov/research-and-data/studies-and-reports>).
9. In addition to my expert witness work in redistricting, I have a long history of developing expert applied demographic analyses, ranging from public health data analysis of mortality statistics related to opioid use and tobacco use, public housing discrimination, and small-area population forecasts for water usage.
10. I have been deposed in the matter of *Harding v. County of Dallas* and have been deposed and/or testified in the matters of *Milligan v. Merrill*, *Thomas v. Merrill*, and *Singleton v. Merrill* over Alabama’s Congressional redistricting initiatives; *Robinson v. Ardoin* and *Galmon v. Ardoin* over Louisiana’s Congressional redistricting initiatives; *Navajo Nation v. San Juan County Board of Commissioners* over San Juan County, New Mexico’s commissioner districts, and *Petteway v. Galveston County, TX* over their county commissioner districts.
11. I have provided bipartisan expert witness support of redistricting cases, including being retained by Democratic counsel as the demographic and redistricting expert for the State of Illinois in the matter of *McConchie v. State Board of Elections*.
12. I have been previously retained to provide expert analytics of the Current Population Survey and the Cooperative Election Study in the matter of *White et al. v. Mississippi State Board of Election Commissioners* (2022) in support of defendants’ demographic expert David A. Swanson. These analytics were used to rebut and correct the analytics of these datasets by the plaintiffs’ expert - and were accepted by the court.
13. I maintain affiliations with several professional demographic organizations, including:
 - American Statistical Association
 - Population Association of America
 - Southern Demographic Association
14. I have been retained at my customary rate of \$450 per hour.

I. SUMMARY AND OPINIONS

15. I have been asked to analyze the number of voters and voter registration rates for the State of Arizona, and to assess any inconsistencies with generally available information and standard demographic analytic techniques. First, I examined the official number of total registered voters from the State of Arizona and compared them with the Citizen Voting Age Population (CVAP) from the US Census Bureau's American Community Survey (ACS) for the state and individual counties. I found that there were counties with more registered voters than CVAP (an impossibility), and that other counties, and the state as a whole, had percentages of registered voters relative to their CVAP that were improbable.
16. I then compared the official reported number and percent of total registered voters³ with the estimated number of total registered voters from two of the largest surveys measuring voter registration in the United States: the Current Population Survey (CPS) and the Cooperative Election Study (CES). These surveys show the number and percent of registered voters are far below what is reported by the state of Arizona.

³ In this analysis, I calculate the voter registration rate as a percent registered of Citizen Voting Age Population, not the Voting Age Population, or "VAP". Nationally recognized political science expert Dr. Michael McDonald (<https://polisci.ufl.edu/michael-mcdonald/>) explains why the vote eligible population is the preferred universe for analysis of rates:

1. The most valid turnout rates over time and across states are calculated using voting-eligible population.
2. Declining turnout rates, post-1971, are entirely explained by the increase in the ineligible population. In 1972, the non-citizen population of the United States was less than 2 percent of VAP and in 2004 it was nearly 8.5 percent of VAP. The percent of non-felons among the VAP have increased from .5 to about 1 percent of the VAP since the mid-1980s.
3. Using VEP turnout rates, recent presidential elections have returned to their levels during the high participation period in the 1950s and 1960s.
4. State turnout rates are not comparable using VAP since the ineligible population is not uniformly distributed across the United States. For example, nearly 20 percent of California's voting-age population is ineligible to vote because they are felons or are not citizens.

See "The United States Elections Project is an information source for the United States electoral system" at <https://www.electproject.org/election-data/faq/vap-v-vap>

Also note that "the CPS sample frame is the resident non-institutional population of the United States. The VEP is broader in that it is an estimate of all persons eligible to vote, regardless if they live in an institution or overseas." This makes no difference in my analysis or conclusions. See also <https://www.electproject.org/election-data/faq/cps>

17. With both the number and percent of registered voters being much higher according to the State of Arizona than the national surveys report, differences can likely be explained by either: the State of Arizona's reported numbers being too high (because of voter roll inaccuracy), or the voter registration estimates from the national surveys being too low. In assessing the possibility that the CPS and CES voter registration statistics were too low, I first considered that they are surveys, subject to sampling and non-sampling errors.⁴ The sampling error is related to the confidence intervals around their voter registration rates. My analysis shows that their registration rates are statistically significantly lower than the State of Arizona's voter registration rates. The non-sampling error I considered is whether respondents accurately reported their voter registration status and whether they turned out to vote accurately. I document that respondents in surveys such as the CPS tend to over-report favorable behaviors such as voter registration (see para 48) and show that the CPS estimates of turnout are higher than actual voter turnout in Arizona (see para 49). Concluding that the difference between these surveys and the State of Arizona's statistics is not attributable to CPS or CES under-reporting - I investigated whether the registered voters reported by Arizona might be too high by analyzing the number of registered voters and voter removals by reason from the Election Administration and Voting Survey (EAVS).⁵ Using standard demographic techniques, I analyze one area of voter removals (deaths) by comparing Arizona's vital statistics on deaths with adult voters removed because of death as one potential indicator of voter roll inaccuracy.
18. My examination uncovered inconsistencies that raise concerns about the reported number of total registered voters in Arizona.⁶ Based on my analysis, several counties have more total registered voters than citizen voting age population (or "CVAP", the eligible pool of registered voters).⁷ In my first analysis, using the 5-year 2017-2021 vintage of the ACS CVAP estimates, I find that there are four counties with more registered voters than CVAP (Apache, La Paz, Navajo and Santa Cruz) with Apache and Santa Cruz having statistically significantly more registered voters than CVAP. Using the 2018-2022 vintage of the ACS CVAP estimates, I find that there are three counties with more registered voters than CVAP (Apache, La Paz and Santa Cruz) with all three having statistically significantly more registered voters than CVAP.

⁴ See Morrison, P., & Bryan, T. (2019). *Redistricting: A manual for Analysts, Practitioners and Citizens*. New York: Springer. Section 3.4.1 "Understanding Sampling Error" and Section 3.4.2 "Understanding non-Sampling Error"

⁵ <https://www.eac.gov/research-and-data/datasets-codebooks-and-surveys-old>

⁶ My analysis focuses on total registered voters, not active registered voters, because inactive registered voters would still be required to be a part of the Voting Eligible Population. As the EAVS reports: inactive voters are voters who were eligible to vote but required address verification under the provisions of the National Voter Registration Act (NVRA). See: https://www.eac.gov/sites/default/files/EAVS%202022/2022_EAVS_FINAL_508c.pdf page 6. In this report – "registered voters" refers to total, not active unless stated otherwise.

⁷ See Appendix 1 for an analysis of the impact of calculating voter registration rates using VAP vs. CVAP, and total registered vs. active registered.

The most recent ACS dataset, the 1-year 2022 ACS does not include CVAP data for all counties (it does not include smaller counties). The 1-year 2022 ACS reports larger counties and for the state of Arizona as a whole. From this dataset, it is notable that Apache County continues to have statistically significantly more CVAP than registered voters (see [Table III.B.1](#)). In this regard, Apache county has significantly more registered voters than CVAP when compared to three separate ACS vintages relevant to the study period.

19. While it is impossible for there to be more registered voters than CVAP, it is also highly improbable that Arizona, or any of its counties, would have extraordinarily high voter registration rates, such as over 90%. To illustrate this at the state level, I compare the number and percent of registered voters reported from Arizona (using EAVS) with the Current Population Survey (CPS) and the Cooperative Election Study (CES). From EAVS, I find that there are 4,833,160 total registered voters in Arizona in 2022 – which represents between 90.8% and 96.7% of Arizona CVAP (depending on the vintage of ACS being used as a denominator, see [Table III.B.1](#)). By comparison, the CPS reports 3,560,000 (or 69.9% of Arizona CVAP, see [Table IV.A.1](#)). The CES reports 70.9% registration from their pre-election series (or an estimated 3,773,000 registrants based on the Arizona 2022 1-year CVAP), and 81.4% registration from their post-election series (or an estimated 4,333,000 registrants based on the Arizona 2022 1-year CVAP) see [Table IV.B.1](#).
20. The largest difference between the official number of registered voters in Arizona in 2022 (4,833,160) and the smallest number among these survey results (the 2022 CPS, at 3,560,000) is approximately 1.3 million unaccounted-for registered voters. A “middle estimate” of the difference between the official number of registered voters in Arizona in 2022 (4,833,160) and the intermediate estimate of registered voters (the 2022 CES pre-election, at 3,773,000) is approximately 1.1 million unaccounted-for registered voters. The smallest difference between the official number of registered voters in Arizona in 2022 (4,833,160) and the largest number among these survey results (the 2022 CES post-election, at 4,333,000) is approximately 500,000 unaccounted-for registered voters. All of these differences, down to the 500,000 difference found when comparing to the 2022 CES post-election estimate, are *far* more than the 432,498 total removals already being reported from the 2022 EAVS reporting period.⁸ No national survey result remotely approaches the >90% voter registration rate or 4.8MM registered voters reported in Arizona, and as we will see – the use of surveys such as the CPS and CES are conservative comparators because there is evidence that these surveys *overstate* registration and voter turnout.

⁸ Between the close of registration for the November 2020 general election and the close of registration for the November 2022 general election. See: 2022 EAVS total reported removals for Arizona from https://www.eac.gov/sites/default/files/2023-06/2022_EAVS_for_Public_Release_V1.xlsx variable A9a

21. To illustrate this at the county level, I compare the registration rates of each Arizona County with the statewide 81.4% registration rate from the CES post-election series in 2022 (see [Table III.B.1](#)). Using the 2017-2021 ACS CVAP data, only one county (Greenlee) is below this threshold at 76.1%. Using the 2018-2022 ACS CVAP data, only two counties (Graham and Greenlee) are below this threshold at 80.4% and 76.5% respectively. Using the 1-year 2022 ACS CVAP data (which is limited to counties above 50,000) no counties are below this threshold.
22. In summary, the information provided by the Arizona Secretary of State differs significantly from the two leading national surveys: the CPS and the CES. If the highest voter registration statistic from an independent survey is 81.4% (knowing that surveys are prone to over-reporting voter registration) and the lowest voter registration statistic from the State of Arizona is 90.8% - this suggests the official voter registration statistics for the State of Arizona are inflated.
23. The number of registered voters is a continuous function of new voters being added to the voter rolls, and ineligible voters being removed. The Election Administration and Voting Survey (EAVS) published by the U.S. Election Assistance Commission is beneficial in this regard, because it provides the number of voters, the number of voters being removed (as directly reported by the state), as well as the number of voters removed. So, in an effort to understand *why* the number and percent of registered voters is so much higher than the reported CPS and CES registration rates in Arizona, I use the EAVS dataset to explore voter removals *by reason*. Since it is relatively easy to measure using generally available data and standard demographic analytic techniques, I first focus on analyzing the difference between the number of deaths during the study period and the number of registered voters who were removed from the rolls because of death. As I considered the inconsistencies I observed, my hypothesis was that not all adult registered voter decedents are being removed from the voter rolls. Using the number of total deaths from the Arizona Department of Health⁹ and using conservative demographic techniques to adjust them downward (removing estimates of minor decedents and non-citizen decedents), I estimate that the actual number of registered voters who died during the study period is in a range between 130,096 and 143,278 – representing a difference of between 22,000 and 35,000 over the 108,103 voters removed from the rolls because of death - a meaningful share of the 500K difference between Arizona’s records and the results of our nation’s leading survey research. Based on this, I concluded that my hypothesis was correct and that not all registered voter decedents are being removed from the voting rolls.
24. I focused on the mortality analysis because it is a straightforward demographic exercise, and because death is a leading reason for removal, accounting for approximately 25% of all removals (see [Table V.A.1](#)). But other significant reasons exist why voters are removed from

⁹ <https://pub.azdhs.gov/health-stats/mu/index.php>

Arizona's voter rolls, such as the voter moving out of the jurisdiction and disqualifying felony convictions. Since EAVS serves as a complete, and (in theory) exhaustive accounting of all removals – the remaining ~465K to ~478K unaccounted for registered voters (the difference between 4.83MM actual registered and 4.33MM estimated registered from the 2022 CES, less 22K to 35K missing removals because of death) must be accounted for elsewhere among these reasons. From the removal categories that are left, the only ones that are large enough to potentially accommodate these large differences are removals because of (A9b) moved out of jurisdiction, (A9e) and failure to respond to confirmation notices.¹⁰

25. My conclusions and opinions here are based upon the following sources of statistics for Arizona:

- 1) Arizona Secretary of State Statistics on Registered Voters from the Election Administration and Voting Survey, or “EAVS”;
- 2) Current Population Survey (CPS) statistics on Arizona registered voters from their 2022 November Voting Supplement¹¹;
- 3) Cooperative Election Study (CES) statistics on Arizona registered voters;
- 4) Arizona Department of Health Services (ADHS) official counts of deaths by place of residence for Arizona residents¹²; and
- 5) The number of Arizona voters who were removed from the voter registration rolls by reason of death, as reported in the 2022 Election Administration and Voting Survey (EAVS).¹³

¹⁰ Notably, the EAVS dataset collects and reports information on the number of confirmation notices sent to registered voters (variable A8a), with counts of the number received back confirming registration (A8b), counts of registrations that should be invalidated (A8c), counts of notices that were returned as undeliverable (A8d) and counts of unreturned confirmation notices (A8e). With the exception of one county (Maricopa) the number of each county's sent notices (A8a) is completely accounted for with variables A8b through A8e. That is – each confirmation letter sent has a corresponding resolution. For Maricopa County, who sent out 752,387 confirmation notices during the study period (December, 2020 through November 2022) – they reported that they do not have any data available on how any of those confirmation notices were resolved. We do know from the 2022 EAVS A9 variable that Maricopa County had 51,208 removals (A9b) “because the registrant moved outside the jurisdiction”, and 80,474 removals (A9e) “because the registrant did not respond to confirmation letters” – leaving at least 620,000 confirmation letters unaccounted for. In light of the differences between the State of Arizona and national survey results, and the fact that statistics on confirmation notices have been previously reported by Maricopa County (as recently as 2020) and were reported by all other Arizona counties in 2022 - this lack of accounting and inconsistency in reporting for Arizona's largest county compared to all other Arizona counties is concerning.

Source: https://www.eac.gov/sites/default/files/2023-12/2022_EAVS_for_Public_Release_V1.1.xlsx

¹¹ <https://www.census.gov/library/visualizations/interactive/cps-voting-supplement.html>

¹² <https://schs.dph.ncdhhs.gov/data/provisional/>

¹³ <https://www.eac.gov/research-and-data/studies-and-reports>

II. ASSIGNMENT

26. My assignment is to examine the number of registered voters, and the components of voter removals in the State of Arizona, and to understand inconsistencies in factors that are responsible for the removal of voters from rolls, such as deaths. My analysis is for the period beginning from December 2020 to the end of November 2022 (the “study period”) which is derived from the most recent reporting period of registered voters and voter removals from the National Election Administration and Voting Survey (EAVS).¹⁴
27. My compensation for my work on this case is not dependent on the substance of my opinions or the outcome of this case.
28. In [Section III](#), I provide an analysis of the citizen voting age population (“CVAP”) from the U.S. Census American Community Survey (ACS) and the number of registered voters in Arizona from the EAVS dataset.¹⁵
29. In [Section IV](#), I follow this with an analysis of the Current Population Survey (CPS) and the Cooperative Election Study (CES) to compare their estimates of registered voters with what is reported by the State of Arizona.
30. In [Section V](#), I analyze the number deaths of adult citizens in Arizona and compare that with removals of registered voters because of death from EAVS.
31. In [Section VI](#), I provide my conclusions.
32. In [Section VII](#), I provide my references.
33. In [Section VIII](#), I provide my appendices.
34. In forming my opinions, I have considered all materials cited in this report as well as:
 - 1) A notification letter sent from Holtzman Vogel (HV) to the Arizona Secretary of State’s office to Holtzman Vogel dated August 8, 2023
 - 2) Reply correspondence from the Arizona Secretary of State’s office to Holtzman Vogel dated August 15, 2023
 - 3) Reply correspondence from HV to the Arizona Secretary of State’s office dated September 12, 2023
35. I reserve the right to further supplement my report and opinions.

¹⁴ <https://www.eac.gov/research-and-data/studies-and-reports>

¹⁵ The number of active registered voters from EAVS matches the number reported by the Arizona Secretary of State for 2022: 4,143,929 (<https://azsos.gov/elections/results-data/voter-registration-statistics>)

III. CVAP and Registered Voter Differences

A. Citizen Voting Age Population

36. The American Community Survey (ACS) is the official source of record for national Citizen Voting Age Population (or “CVAP”) data. The survey is a set of “rolling” sample surveys conducted by the U.S. Census Bureau (Morrison and Bryan, 2019; US Census Bureau, 2020a). It is distinct and different from the Decennial Census and the Current Population Survey, which also are conducted by the U.S. Census Bureau. The ACS provides data that the US Department of Justice commissions and relies on for adjudicating VRA cases.¹⁶ The US Census Bureau began tabulating CVAP data starting back in 2002, and currently produces a new 1-year and 5-year dataset annually.
37. At the time of the original HV August 8, 2023 notification letter, only the 5-year 2017-2021 ACS CVAP dataset was available.¹⁷ Since then, the 5-year 2018-2022 and 1-year 2022 ACS datasets have been released. While each of these ACS vintages will be used in my analysis, the 1-year 2022 vintage is most important because it contains the 2022 election cycle and is unperturbed by earlier years of ACS data that are parts of the 2017-2021 and 2018-2022 5-year datasets.

Table III.A.1 Arizona ACS CVAP Statistics by Vintage: 2017-2021, 2018-2022 and 2022

Geography	2017-2021 5-year CVAP	2018-2022 5-year CVAP	2022 1-Year CVAP
Apache	48,002	48,085	48,096
Cochise	93,080	94,116	94,779
Coconino	111,746	111,990	112,684
Gila	41,905	42,340	NA
Graham	27,616	27,942	NA
Greenlee	6,782	6,746	NA
La Paz	13,014	12,681	NA
Maricopa	2,998,592	3,079,626	3,218,330
Mohave	169,576	172,944	181,825
Navajo	77,149	78,419	80,594
Pima	763,822	775,517	798,113
Pinal	305,976	317,927	338,587
Santa Cruz	28,562	28,834	NA
Yavapai	188,873	192,907	201,459
Yuma	125,407	128,479	130,763
TOTAL AZ	5,000,102	5,118,553	5,322,581

Source: <https://data.census.gov/all?q=b05003>

¹⁶ Morrison, P. and T. Bryan (2019). Redistricting: A Manual for Analysts, Practitioners, and Citizens. Springer. Cham, Switzerland

¹⁷ There was also a 2021 1-year ACS dataset, which I do not consider here because it is not the most recent and is not referred to in existing correspondence.

B. EAVS Number of Registered Voters

38. The ACS CVAP estimates serve as the *denominators* for calculating the percent of eligible voters who are registered to vote. The numerators are the number of those who are actually registered (see [Appendix 1](#) for further discussion). The national, uniform source of that is the Election Administration and Voting Survey, or “EAVS”. The U.S. Election Assistance Commission reports that “Since 2004, the U.S. Election Assistance Commission (EAC) has conducted the EAVS following each federal general election to provide data about the ways Americans vote and how elections are administered.”¹⁸ The EAVS provides statistics on the total number of registered voters and the number of active registered voters who were eligible to vote in the 2022 general election (see [Figure III.B.1](#)). Each state, including Arizona, participates in EAVS.

Figure III.B.1 2020 Election Administration and Voting Survey Registration Questions

Total Registrations: Questions A1 and A2

Questions A1 and A2 ask about individuals who were registered and eligible to vote in the 2022 general election. This includes all individuals who were registered to vote and who were included on the final voter registration rolls for the election. For states with Election Day voter registration, include all individuals who registered to vote through the close of the polls on Election Day.

Please do not include:

- Individuals who registered to vote after the close of registration for the 2022 general election and who were not eligible to vote in the 2022 general election, or
- Persons under the age of 18 who registered under a pre-registration program.

If your jurisdiction’s number includes any special groups or situations that we should be aware of, please use the A1 Comments box to explain.

A1. Total Number of Registered and Eligible Persons, Active and Inactive

For question A1, report the total number of people (not votes or ballots) who were registered and eligible to vote in the November 2022 general election. If your jurisdiction differentiates between active and inactive voters, report the number of active voters in A1b and inactive voters in A1c. If your state does not make this differentiation, report the total number of registered voters again in A1b and enter -88 (negative 88) as the response to A1c. The sum of active voters in A1b and inactive voters in A1c should equal the total number of registered voters reported in A1a.

Type of Registered Voter	Total
A1a. <u>TOTAL number of registered and eligible voters:</u> Do not include individuals who registered after the 2022 deadline for registration or individuals under the age of 18 who may have registered under a pre-registration program.	
A1b. <u>TOTAL number of active voters:</u> Fully eligible voters who had no additional processing requirements to fulfill before voting.	
A1c. <u>TOTAL number of inactive voters:</u> Voters who were eligible to vote but required address verification under the provisions of the National Voter Registration Act (NVRA).	

Source: https://www.eac.gov/sites/default/files/EAVS%202022/2022_EAVS_FINAL_508c.pdf

¹⁸ https://www.eac.gov/sites/default/files/2023-06/2022_EAVS_Report_508c.pdf

39. Using the estimates of CVAP, total registered voters, and active registered voters, I perform three separate analyses to estimate the percent of those eligible to vote in Arizona who are registered:
- The first uses the number of total registered voters as a numerator, and 5-year 2017-2021 ACS CVAP as a denominator for the state and all counties
 - The second uses the number of total registered voters as a numerator, and 5-year 2018-2022 ACS CVAP as a denominator for the state and all counties
 - The third uses the number of total registered voters as a numerator, and 1-year 2022 ACS CVAP as a denominator for the state and select counties over 50,000 population
40. The 2022 EAVS reports 4,833,160 *total* registered voters in Arizona¹⁹ which I use as my numerator in calculating the percentage of registered voters among the eligible adult, citizen population. While using the three most recent vintages of the ACS CVAP as my denominator.
41. Among the 5,000,102 CVAP in Arizona in 2017-2021, 4,833,160 represents 96.7% of CVAP. See [Table III.B.1](#). As noted in the original HV notification letter of August 8, 2023, there are four counties: Apache, La Paz, Navajo and Santa Cruz that have more registered voters than CVAP. The difference between Apache and Santa Cruz registered voters and CVAP estimates are statistically significant (see boxed values).
42. Among the 5,118,553 CVAP in Arizona in 2018-2022, 4,833,160 represents 94.4% of CVAP. See [Table III.B.1](#). There are three counties: Apache, La Paz and Santa Cruz that have more registered voters than CVAP. All three are statistically significant (see boxed values). La Paz's registered voters were not statistically significantly higher than CVAP in 2017-2021 but were in 2018-2022 due to a decline in its estimated CVAP.
43. Among the 5,322,581 CVAP in Arizona in 2022, 4,833,160 represents 90.8% of CVAP. See [Table III.B.1](#). I regard the 2022 ACS CVAP estimate as the most appropriate for this analysis, because it most closely coincides with the 2022 election and is the most recent data available. This gives every benefit of the doubt in calculating Arizona's % registered (since it generates the lowest of the three % registered statistics).

¹⁹ It is important to note that there are 4,143,929 *active* registered voters in Arizona, but this analysis focuses on the *total* number of registered voters. I have independently validated the Arizona Secretary of State reported 4,143,929 *active* registered voters from <https://azsos.gov/elections/results-data/voter-registration-statistics> against active registered voters from EAVS.

Table III.B.1 ACS CVAP by Vintage: 2017-2021, 2018-2022 and 2022 and Total Registered Voters²⁰

Geography	2017-2021 5-year CVAP	2018-2022 5-year CVAP	2022 1-Year CVAP	A1a Total Registered "TREG"	%TREG of 17- 21 CVAP	%TREG of 18- 22 CVAP	%TREG of FY 2022 CVAP
Apache	48,002	48,085	48,096	56,461	117.6%	117.4%	117.4%
Cochise	93,080	94,116	94,779	87,376	93.9%	92.8%	92.2%
Coconino	111,746	111,990	112,684	105,278	94.2%	94.0%	93.4%
Gila	41,905	42,340	NA	38,087	90.9%	90.0%	NA
Graham	27,616	27,942	NA	22,469	81.4%	80.4%	NA
Greenlee	6,782	6,746	NA	5,164	76.1%	76.5%	NA
La Paz	13,014	12,681	NA	13,141	101.0%	103.6%	NA
Maricopa	2,998,592	3,079,626	3,218,330	2,939,138	98.0%	95.4%	91.3%
Mohave	169,576	172,944	181,825	161,847	95.4%	93.6%	89.0%
Navajo	77,149	78,419	80,594	77,286	100.2%	98.6%	95.9%
Pima	763,822	775,517	798,113	705,072	92.3%	90.9%	88.3%
Pinal	305,976	317,927	338,587	282,575	92.4%	88.9%	83.5%
Santa Cruz	28,562	28,834	NA	32,244	112.9%	111.8%	NA
Yavapai	188,873	192,907	201,459	187,587	99.3%	97.2%	93.1%
Yuma	125,407	128,479	130,763	119,435	95.2%	93.0%	91.3%
TOTAL AZ	5,000,102	5,118,553	5,322,581	4,833,160	96.7%	94.4%	90.8%

Source: <https://data.census.gov/all?q=b05003>

Note: red represents higher values and green represents lower values. The colors do not convey that an estimate is acceptable or unacceptable, better or worse.

44. Clearly, there should not be any geography with more registered voters than CVAP. But how should we think about the reliability of other estimates that are below 100%, but are still very high? We examine two rigorous pieces of national survey research infrastructure, which provide us independent estimates of Arizona voter registrations to compare with actual voter registrations: the Current Population Survey (CPS) and the Cooperative Election Study (CES).

²⁰ Note: the percent registered estimates differ fractionally from the estimates published in the original HV notification letter.

IV. Registered Voter Differences from the CPS and CES

A. Current Population Survey

45. The Current Population Survey (CPS) is conducted by the US Census Bureau and is described as:

The Current Population Survey (CPS) is one of the oldest, largest, and most well-recognized surveys in the United States. It is immensely important, providing information on many of the things that define us as individuals and as a society – our work, our earnings, and our education.

In addition to being the primary source of monthly labor force statistics, the CPS is used to collect data for a variety of other studies that keep the nation informed of the economic and social well-being of its people. This is done by adding a set of supplemental questions to the monthly basic CPS questions. Supplemental inquiries vary month to month and cover a wide variety of topics such as child support, volunteerism, health insurance coverage, and school enrollment. Supplements are usually conducted annually or biannually, but the frequency and recurrence of a supplement depend completely on what best meets the needs of the supplement's sponsor.

Source: <https://www.census.gov/programs-surveys/cps/about.html>

46. Among the numerous questions and modules the CPS offers is a voting supplement that is conducted every November in election years. In November 2022, the US Census Bureau again collected information from each state on the number of voters, the number of registered voters and their characteristics.²¹ The existing correspondence in this matter already acknowledges the CPS statistics and inconsistencies with the number of registered voters in Arizona. In the original HV notification of August 8, 2023 (page 3) the author writes “The U.S. Census Bureau further reported that Arizona’s statewide voter registration rates for the 2020 and 2018 election were 76.4% and 68.6%. In the Arizona Secretary of State’s response of August 15, 2023, it states (page 2) “As of 2022, there were 5 million total citizens of voting age in Arizona, only 3.5 million of which, or 62.1% were registered to vote according to the US Census estimates”. The Secretary is correct that there were ~5 million citizens, and that ~3.5 million registered – but errs in their citation of the resulting registration rate being 62.1%. Using the exact 2022 registered voter estimate of 3,560,000 registered and 5,093,000 CVAP from their Exhibit A for November 2022 – the percent registered among citizens (*CVAP*) is 69.9%. The 62.1% statistic is the percent of registered voters of the *total VAP* of 5,731,000 in Arizona.²² The

²¹ Census Bureau staff conducted interviews during the period of November 13-22, 2022. See: <https://www2.census.gov/programs-surveys/cps/techdocs/cpsnov22.pdf> (see page 3-1). The CPS does not distinguish between active and inactive voters, asking only “(Were you/Was name) registered to vote in the November 8, 2022 election?” (see page 7-2)

²² See also [Table IV.A.1](#)

Secretary also states (page 2) that “in 2020, Arizona Secretary of State records indicate a total of 4,143,929 active registered voters, while the US Census Bureau data indicates only indicate 3,878,000 registered voters”. The Secretary is again correct in one regard that the US Census Bureau data indicate 3,878,000 total registered voters for 2020, but errs in reporting their own department’s number of active registered voters. The Arizona Secretary of State’s website (<https://azsos.gov/elections/results-data/voter-registration-statistics>, accessed 4-29-24) shows 4,281,308 active registered voters for 2020, while the 4,143,929 active registered voters mentioned in the August 15, 2023 response are from 2022. The Secretary goes on to state (referencing the original HV notification of August 8, 2023) that “the comparators used are estimates that undercount the number of actual registered voters in the state”. In fact, it is the use of the incorrect 2020 active registered voter estimate from the Secretary of State’s office (4.1MM, from 2022) instead of the actual (4.3MM, from 2020) against the official US Census Bureau’s 2020 estimate of total registered voters (3.9MM) that creates an underestimate of the magnitude of difference between the two sources for 2020. The difference between the Arizona Secretary of State’s 4.1MM active registered voters in the most recent period (2022) and the US Census Bureau’s total registered voter estimate for 2022 (3.6MM) is even larger. The attempted use of older 2020 estimates, when 2022 data were available, and the comparison of active registered voters against total registered voters skew the data, interpretation and conclusions against HV. Unrelated to the accuracy of the numbers used by the Secretary – the comparisons being made are between active registered voters and total registered voters (from the CPS) are between the proverbial apple and orange. As discussed in [Appendix 1](#), there are large differences between active and registered voters for Arizona (and indeed all states) – and any comparisons like this should be made between like apple to apple quantities. That is, the fair comparison is between total to total registered voters, which is the analysis I perform here. The Secretary goes on to highlight the differences between active registered voters and total registered voters not only in Arizona but in other states between the consistently higher number of active registered voters and those consistently lower numbers of total registered voters reported in the CPS. A comparison of total registered to total CPS registered voters is even greater. My analysis gives the State of Arizona every benefit of the doubt in estimating their percent of total registered voters *downward*, and estimating the percent of total registered voters from our national surveys *upward* to minimize the difference of unaccounted for registered voters as much as possible. I find that even after doing so, significant differences still exist.

47. The national percent of registered voters of CVAP in 2022 from the CPS is 69.1% (see [Table IV.A.1](#)). Based on the 69.9% registered voter statistic reported by the CPS in 2022 for Arizona – the margin of error (MOE) is 3.3% (90% CI, see [Table IV.A.1](#)) - meaning that the CPS estimate *could* be as high as 73.2% (implying 3.728MM registered). But not even this upper bound of possible CPS registered voters is even remotely close to the number of total registered

voters (4.833MM) or even the number of *active* registered voters (4.144MM²³) from the State of Arizona in 2022. There are two possible explanations. Either the number of registered voters reported by the State of Arizona is too high (because of voter roll inaccuracy), or the estimated number of registered voters reported by the CPS is too low.

Table IV.A.1 2022 CPS Estimated VAP, CVAP and Registered Voters Table 4B (in millions), Percent Registered and Margins of Error

Characteristics		VAP	CVAP	Registered				
				Total registered	Percent registered (Total)	Margin of error ¹	Percent registered (Citizen)	Margin of error ¹
UNITED STATES	Total	255,457	233,546	161,422	63.2	0.5	69.1	0.5
ARIZONA	Total	5,731	5,093	3,560	62.1	3.2	69.9	3.3

Source: https://www2.census.gov/programs-surveys/cps/tables/p20/586/vote04b_2022.xlsx

48. Historically, one of the biggest criticisms of the CPS is not that it *under*-reports voter registration, but rather *over*-reports it. Numerous journal articles over the years (Bernstein et. al. 2003, Berent et. al. 2016, Abramson and Claggett, 1991, Abramson and Claggett, 1989, Abramson and Claggett, 1986, Abramson and Claggett, 1984) discuss over-reporting of voter registration and voter turnout by respondents since the beginning of the CPS. In fact, the US Census Bureau themselves report:

Estimates in this report are based on responses to the November Voting and Registration Supplement to the Current Population Survey (CPS), which surveys the civilian, noninstitutionalized population in the United States. Voting estimates from the CPS and other sample surveys have historically differed from those based on administrative records, such as the official reports from each state disseminated collectively by the Clerk of the U.S. House of Representatives and the Federal Elections Commission. **In general, sample surveys like the CPS tend to yield *higher* voting rates than official results.** Potential explanations for these differences include question misreporting, problems with memory or knowledge of others' behavior, and methodological issues related to question wording, method of survey administration, and survey nonresponse bias. Despite these observed differences between CPS estimates and official tallies, the CPS remains the most comprehensive data source available for examining the social and demographic composition of American voters in federal elections, particularly when examining broad historical results.

Source: <https://www.census.gov/content/dam/Census/library/publications/2022/demo/p20-585.pdf>

²³ <https://azsos.gov/elections/results-data/voter-registration-statistics>. Note that the “registered voters” on the State of Arizona’s website are active, not total registered voters – based on a comparison with the 2022 EAVS dataset.

49. We can characterize CPS's reporting of voting behavior not just from what the literature says about registration, but by comparing the other significant statistic it provides (reported voter turnout) with actual voter turnout. In examining the number of ballots cast in the 2022 election according to the State of Arizona²⁴ we find that there were 2,592,313 ballots cast. As shown in [Table IV.A.2](#), the CPS estimates 2,844,000 voted in Arizona in 2022. The difference of 251,687 is indisputable. It represents a nearly 10% overreporting of voting behavior compared to the actual number of votes cast in the 2022 election. This finding reinforces my conclusion that the CPS represents an upper bound of the possible numbers of registered voters and voter turnout.

Table IV.A.2 2022 CPS Estimated VAP, CVAP and Voter Turnout Table 4B (in millions), Percent Turnout

Characteristics		VAP	CVAP	Voted				
				Total voted	Percent voted (Total)	Margin of error ¹	Percent voted (Citizen)	Margin of error ¹
UNITED STATES	Total	255,457	233,546	121,916	47.7	0.5	52.2	0.5
ARIZONA	Total	5,731	5,093	2,844	49.6	3.1	55.8	3.3

Source: https://www2.census.gov/programs-surveys/cps/tables/p20/586/vote04b_2022.xlsx

50. The fact that the upper statistical bound of the number of registered voters from the CPS is far below the number of both total and active registered voters in Arizona, and the fact that the CPS is widely regarded to *overreport* voter registration (and significantly overreports voting turnout) leaves Arizona's reported number of registered voters in question. Are there any other surveys that would corroborate and reinforce either the State of Arizona's reported numbers or the CPS? There is: the Cooperative Election Study, or "CES".

B. Cooperative Election Study

51. A second survey has been developed to measure voter registration and turnout behavior is known as the Cooperative Election Study, or "CES".²⁵ The CES is a robust national survey of over 50,000 adults administered by 62 research teams and leading universities (Harvard, Dartmouth, Georgetown, Yale and more) concurrent with each election. The survey is described as:

The survey consists of two waves in election years. In the *pre-election* wave, respondents answer two-thirds of the questionnaire. This segment of the survey asks about general political attitudes, various demographic factors, assessment of roll call voting choices,

²⁴ <https://azsos.gov/elections/results-data/voter-registration-statistics>

²⁵ <https://cces.gov.harvard.edu/>

political information, and vote intentions. The pre-election wave is in the field from late September to late October. In the *post-election* wave, respondents answer the other third of the questionnaire, mostly consisting of items related to the election that just occurred. The post-election wave is administered in November.

Source: <https://cces.gov.harvard.edu/>

52. While the CPS November voting supplement is the national source of record for voter registration and turnout statistics, the CES has unique features that the CPS does not, including pre-election and post-election waves and voter validation. So as an alternative to the CPS, we can examine the results of the 2022 CES for Arizona. The CES provides results (and corresponding weights) for adult citizen respondents who only answer the pre-election wave (n=1,608), as well as results (and corresponding weights) for those who also answer the post wave (n=1,383).²⁶ (see [Appendix 2](#)). The purpose of using both the estimates of the pre-election wave, as well as the pre-election and post-election wave are to provide a range of registration estimate values. Those answering the pre-election questions only should provide more conservative registration rates – and should be more consistent with CPS results. Those answering both the pre-election and post-election waves should generate higher registration rates because a) those respondents would have been more engaged with the survey; and, b) some respondents who originally reported they were not registered may have realized they were registered during the 2022 electoral process (9 CES respondents in 2022 did this).
53. The 2022 CES reports 70.9% voter registration among the *pre-election* wave of citizen respondents, and 81.4% voter registration among the *post-election* wave of citizen respondents for Arizona (See [Appendix 2](#)). The CES 70.9% pre-election statistic closely aligns with the CPS voter registration statistic of 69.9% and (as expected) the CES post-election registration rate of 81.4% is higher. This estimate, however, is still nowhere near the more than 90%+ voter registration reported by the Arizona Secretary of State.
54. So the smallest difference between all Arizona registered voters (90.8%, or 4.833MM) and the largest possible value from the 2022 national surveys (the 2022 CES post-election wave, with 81.4%, or 4.333MM) is 9.4 percentage points, or ~500,000 registered voters. It is also notable that the 2022 CPS estimate of 3.560MM and the 2022 CES pre-election estimate of 3.773MM

²⁶ The CES technical documentation provides direction on which weights to use for different analyses. They documentation states “We recommend the use of “commonweight” any time researchers wish to characterize the opinions and behaviors of adult Americans. However, use “commonpostweight” when you wish to characterize the opinions and behaviors of adult Americans but you are using any items from the post-election wave of the questionnaire.” For the pre-election wave, the votereg variable “are you registered to vote” was selected and weighted with the commonweight. For those answering the pre-election and post-election wave, the votereg_post “are you registered to vote” variable was selected and was weighted with the commonpostweight.

are both also lower than the Arizona Secretary of State number of *active* registered voters: 4,143,929.²⁷

55. Unlike the CPS, the CES does not publish official tables of summary statistics for their estimates, so I have independently calculated²⁸ 90% confidence intervals (CI) at +/- 3.6% around the pre-election estimate of 70.9% and +/-6.5% around the post-election estimate of 81.4%. Adding the 6.5% CI to the 81.4% post-election registration statistic yields the highest possible CES registration rate of 87.9%. Higher, but still not the 90.8% registration rate we get from Arizona.

Table IV.B.1 Summary of CVAP and Number and Percent of Registered Voters by Source

Arizona ACS and Sec. of State	CPS and CES National Surveys
<p>A. 2017-2021 ACS & 2022 AZ Sec. of State</p> <p>4,833,160 registrants</p> <p>CVAP 5,000,102</p> <p>96.7% Registration</p>	<p>B. 2022 CPS</p> <p>3,560,000 registrants</p> <p>5.093MM CVAP (reported)</p> <p>69.9% +/- 3.3% Registration</p>
<p>C. 2018-2022 ACS & 2022 AZ Sec. of State</p> <p>4,833,160 registrants</p> <p>CVAP 5,118,553</p> <p>94.4% Registration</p>	<p>D. 2022 CES Pre-Election</p> <p>3,773,000 estimated* registrants</p> <p>ACS 2022: 5,322,581 CVAP</p> <p>70.9% Registration</p>
<p>E. 2022 ACS & 2022 AZ Sec. of State</p> <p>4,833,160 registrants</p> <p>ACS 2022: 5,322,581 CVAP</p> <p>90.8% Registration²⁹</p>	<p>F. 2022 CES Post-Election</p> <p>4,333,000 estimated* registrants</p> <p>ACS 2022: 5,322,581 CVAP</p> <p>81.4% Registration</p>

* The CES does not report population weights, only sample weights – so estimates of registrants are made by multiplying these percentages by the 2022 ACS reported CVAP of 5,322,581. Slight differences may occur due to rounding.

²⁷ <https://azsos.gov/elections/results-data/voter-registration-statistics>

²⁸ By calculating a weighted average and its standard deviation, then deriving the standard error

²⁹ See also calculations in Appendix 1

56. In summary, the information provided by the Arizona Secretary of State differs significantly from the two leading national surveys: the CPS and the CES. If the highest voter registration rate from an independent survey is 81.4% of CVAP (knowing that surveys are prone to over-reporting) and the lowest voter registration statistic from the State of Arizona is 90.8% of CVAP - this suggests the official voter registration statistics for the State of Arizona are inflated.
57. It is fortunate that the EAVS study provides information on voter registration maintenance for each state, including the number of registrants who are removed because of things such as moving, non-response to residence inquiries, and deaths. While some of these metrics are difficult to quantify, one is not. The State of Arizona (like many states) reports the actual number of deaths in detail through the state health department. In determining whether the Arizona's voter registration statistics may be inflated due to inadequate maintenance, we can perform a simple analysis comparing how many people in Arizona died during the study period, and how many people were removed from the voter rolls because of death. It is this analysis that I perform next.
58. In [Table V.C.2](#), one can also estimate the number of removals needed for different counties to have avoided impossible registration rates over 100%. For example, in Apache County there were 3,648 registered voters removed during the study period, which left 56,461 total registered voters, but only 48,085 CVAP as of the 2018-2022 ACS (a 117.4% registration rate, see [Table III.B.1](#)). In order for Apache county to only have every voting-age citizen be registered (reducing the 117.4% registration rate to a 100% registration rate) – they would have needed to have removed at *least* 8,376 (56,461 total registered voters - 48,085 CVAP) *additional* registered voters from their rolls – or to have removed at least twice as many registered voters as they actually did. But Apache County's registration rate cannot be 100%, so the actual number of registered voter removals that would be necessary for Apache County's actual registration rate to be realistic would be far greater.

Since we know that not all CVAP are registered voters, even more would need to be removed. For example – for Apache County to match the 2022 CES post-election statewide voter registration rate of 81.4% (out of 48,085 CVAP, which would result in 39,141 registered voters) you would need to remove 8,944 more registered voters. All told, for Apache County to move from their current 117.4% registration rate (56,461 total registered voters) to an 81.4% registration rate (39,141 total registered voters) would necessitate the removal of 17,320 voters from their rolls, or approximately 30% of their current registered voters. The use of *active* registered voters in this analysis instead of *total* registered voters does not afford Apache County any relief. According to the 2022 EAVS (A1b) there were 51,981 active registered voters – also far higher than the number of 2022 CVAP, let alone a realistic voter registration estimate.

V. REGISTERED VOTER DEATHS

A. Registered Voters Who Have Been Reported to Have Been Removed From The Arizona Voter Rolls Because Of Death from EAVS

59. In addition to providing estimates of the number of registrants, EAVS provides estimates on when and where voter registrations were processed, confirmation notices that have been sent, and important to this exercise: the number of voters who have been removed from the voter rolls (and why) between the close of registration for the November 2020 General Election and the close of registration for the November 2022 General Election (the “study period”). This is shown as variable A9 in [Figure V.A.1](#).

Figure V.A.1 EAVS Question A9 Voters Removed from the Registration Rolls 2020-2022

A9. Total Voters Removed From the Registration Rolls: 2020 to 2022

For question A9a, report the total number of voters removed from the voter registration rolls in your jurisdiction in the period between the close of registration for the November 2020 general election and the close of registration for the November 2022 general election. Note that this question asks for those removed from the list of registered voters, not those moved to an “inactive” registration status.

Next, for questions A9b–A9g, divide the total number of voters removed from the voter registration rolls (as reported in A9a) into the listed categories. Use items A9h–A9j for removals that cannot be placed into any of the categories specified in A9b–A9g. The amounts in A9b–A9j should sum to the total provided in A9a.

Reason for Removal	Total
A9a. <u>TOTAL number of voters removed from the voter registration rolls:</u> Include only individuals who were completely removed from the list of registered voters, not records that were moved to an inactive list.	
A9b. <u>Moved outside of jurisdiction</u>	
A9c. <u>Death</u>	
A9d. <u>Disqualifying felony conviction</u>	
A9e. <u>Failure to respond to confirmation notice sent and failure to vote in the two most recent federal elections</u>	
A9f. <u>Voter declared mentally incompetent</u>	
A9g. <u>Voter requested to be removed for reasons other than those listed above</u>	
A9h. <u>Other:</u> _____	
A9i. <u>Other:</u> _____	
A9j. <u>Other:</u> _____	
A9 Comments:	

Source: https://www.eac.gov/sites/default/files/EAVS%202022/2022_EAVS_FINAL_508c.pdf

60. For the study period, EAVS reports that there were 432,498 total voters removed from Arizona's voter rolls.³⁰ 81,637 of these were removed because the voters had moved, 175,284 were removed because the voters failed to respond to confirmation notices, 15,172 were removed because of felony convictions (see [Table V.A.1](#)). For the purpose of this study, it is variable A9c "death" for which there were 108,103 removals where I now focus my analysis.

Table V.A.1 2022 EAVS Removal for Arizona, by Reason

<u>Reason for Removal</u>	<u>Number</u>
A9a. TOTAL number of voters removed from the voter registration rolls:	432,498
A9b. Moved outside of jurisdiction	81,637
A9c. Death	108,103
A9d. Disqualifying felony conviction	15,172
A9e. Failure to respond to confirmation notice sent and failure to vote in the two most recent federal elections	175,284
A9f. Voter declared mentally incompetent	717
A9g. Voter requested to be removed for reasons other than those listed above	50,092
Other	1,493

Source: https://www.eac.gov/sites/default/files/2023-12/2022_EAVS_for_Public_Release_V1.1.xlsx

B. Estimating Adult Citizen Deaths from Total Deaths

61. This exercise estimates deaths of adult registered voters during the study period (December 2020 to November 2022) using the following steps:

- 1) Start with estimated total deaths during the study period;
- 2) remove an estimate of deaths of minors during this same time period (which is a very small number);
- 3) adjust this number of deaths downward further by estimating deaths only among CVAP to create an *upper* bound of possible deaths;
- 4) estimate deaths of registered voters among CVAP using the lowest State of Arizona registration rate to create a *lower* bound of possible deaths.

³⁰ https://www.eac.gov/sites/default/files/2023-10/2022_EAVS_Data_Brief_AZ_508c.pdf

62. The Arizona Department of Health Services (ADHS) reports monthly resident deaths by county of residence and month for each year.³¹ In order to calculate deaths for the 24-month period from December 2020 through November 2022, I have acquired the 2020 vital statistics (from which I used the month of December mortality data), the 2021 vital statistics (from which I used the entire year of mortality data), and the 2022 vital statistics (from which I used the January - November mortality data).³² For this 24 month period, there were 157,605 reported resident deaths in Arizona. See [Table V.B.2](#).³³
63. Next, I made age adjustments to these 24 months of data by subtracting an estimated number of minor deaths. As shown in the 2020 U.S. Life Tables, the percent of the total population who will die before the age of 18 in the United States is extremely small – 0.902% (not refined to citizens, as I will discuss in para 65) as shown in column l_x of [Table V.B.1](#).

Table V.B.1 2020 Life Expectancy and Survival for the US³⁴

Table 1. Life table for the total population: United States, 2020

Spreadsheet version available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/71-01/Table01.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
0–1.....	0.005394	100,000	539	99,530	7,699,496	77.0
1–2.....	0.000318	99,461	32	99,445	7,599,966	76.4
2–3.....	0.000211	99,429	21	99,418	7,500,521	75.4
3–4.....	0.000174	99,408	17	99,399	7,401,103	74.5
4–5.....	0.000134	99,391	13	99,384	7,301,703	73.5
5–6.....	0.000128	99,377	13	99,371	7,202,319	72.5
6–7.....	0.000117	99,365	12	99,359	7,102,948	71.5
7–8.....	0.000109	99,353	11	99,348	7,003,590	70.5
8–9.....	0.000100	99,342	10	99,337	6,904,242	69.5
9–10.....	0.000092	99,332	9	99,328	6,804,905	68.5
10–11.....	0.000091	99,323	9	99,319	6,705,577	67.5
11–12.....	0.000103	99,314	10	99,309	6,606,258	66.5
12–13.....	0.000138	99,304	14	99,297	6,506,950	65.5
13–14.....	0.000201	99,290	20	99,280	6,407,653	64.5
14–15.....	0.000287	99,270	28	99,256	6,308,372	63.5
15–16.....	0.000382	99,242	38	99,223	6,209,117	62.6
16–17.....	0.000480	99,204	48	99,180	6,109,894	61.6
17–18.....	0.000583	99,156	58	99,127	6,010,714	60.6
18–19.....	0.000687	99,098	68	99,064	5,911,587	59.7

³¹ <https://pub.azdhs.gov/health-stats/mu/index.php>

³² This is my closest approximation to the time period described for questions A9 reporting “For question A9a, report the total number of voters removed from the voter registration rolls in your jurisdiction in the period between the close of registration for the November 2020 general election and the close of registration for the November 2022 general election.” In studying all Arizona death statistics, the 157,605 estimated deaths for this specific period do not materially change if one moves the time period slightly forward or backwards.

³³ Notably, this number of deaths is invariant whether one moves this time period slightly forward or backwards. There were 75,700 deaths in 2020, 81,482 deaths in 2021 and 73,861 deaths in 2022. Any 24 month period covering these years will show 157,000 to 158,000 deaths.

³⁴ <https://www.cdc.gov/nchs/data/nvsr/nvsr71/nvsr71-01.pdf>

64. The State of Arizona provides deaths by age of decedent by year through 2021.³⁵ Since many of the counties in Arizona are very small, I rely on the death statistics by age for the state as a whole (rather than by county) for 2017-2021 to create a stable estimate of minor deaths.

- In 2017 there were an estimated 894 (1.6% of all deaths) decedents <18
- In 2018 there were an estimated 927 (1.6% of all deaths) decedents <18
- In 2019 there were an estimated 894 (1.5% of all deaths) decedents <18
- In 2020 there were an estimated 954 (1.3% of all deaths) decedents <18
- In 2021 there were an estimated 996 (1.2% of all deaths) decedents <18

65. A weighted average of these years is 1.4% - is slightly higher than, but consistent with the 0.902% of all deaths attributable to minors for the U.S. as a whole from the 2020 U.S. Life Table and suggests that Arizona has a fractionally higher rate of minor mortality than the nation as a whole. Removing 1.4% of decedents from 157,605 total decedents results in an estimate of 2,206 minor decedents, leaving an estimated 155,394 total adult decedents. See [Table V.B.2](#). While the number of minor decedents is small, using the larger estimate of 1.4% (as opposed to .902% from the U.S. Life Tables) errs on the side of caution and gives the estimate the benefit of the doubt – downward toward Arizona’s reported number of voters removed because of death. Next, I multiply these estimated deaths by the percent citizenship rates from the 2018-2022 ACS (the latest series for which all counties are available, see [Appendix 3](#)) to eliminate the deaths of estimated non-citizens (who would not be eligible to register to vote). This leaves an estimated 143,278 adult *citizen* decedents for the study period (see [Table IV.B.1](#)), which implicitly assumes 100% voter registration among CVAP and therefore represents an *upper* bound of possible voter registration deaths.

66. Within this estimate is an unknown number of decedents who were actually registered voters. If we rely on the 90.8% voter registration rate among CVAP from the State of Arizona, this would result in a *lower* bound of estimated registered voter deaths of 130,096.

C. Analysis of Estimated Registered Voter Deaths

67. Statewide, using the *upper* bound assumption that all 143,278 estimated adult citizen deaths (see [Table V.C.1](#)) were registered voters (an assumption very nearly achieved with 96.7% of CVAP registered using the 2017-2021 ACS CVAP data, see [Table IV.B.1](#)) there is a difference from voters removed from the rolls because of death as reported in 2022 EAVS (108,103) of 35,175.

³⁵ <https://pub.azdhs.gov/health-stats/menu/info/trend/index.php?pg=deaths>

68. Using the *lower* bound assumption that 90.8% of all 143,278 estimated adult citizen deaths were registered voters (or 130,096 deaths using registration based on the 1-year 2022 ACS CVAP data, see [Table IV.B.1](#)) results in a registered voter death estimate of 130,096. This is a difference from voters removed from the rolls because of death as reported in 2022 EAVS (108,103) of 21,993.

Table V.C.1 Estimated Number of CVAP Decedents December 2020–November 2022

Geography	Total Deaths	Minus 1.4% for Minor Deaths	Estimated VAP Deaths	Estimated 2018-2022 Citizenship	Estimated CVAP Deaths
Apache	2,249	-31	2,218	99.1%	2,197
Cochise	3,566	-50	3,516	95.1%	3,342
Coconino	2,240	-31	2,209	96.6%	2,134
Gila	2,013	-28	1,985	98.3%	1,951
Graham	907	-13	894	98.6%	882
Greenlee	178	-2	176	97.9%	172
La Paz	810	-11	799	90.8%	725
Maricopa	84,929	-1,186	83,740	90.4%	75,700
Mohave	8,722	-122	8,600	96.7%	8,318
Navajo	3,502	-49	3,453	98.8%	3,413
Pima	25,228	-352	24,875	93.2%	23,195
Pinal	9,486	-133	9,353	94.1%	8,800
Santa Cruz	832	-12	820	81.8%	671
Yavapai	7,995	-112	7,883	96.3%	7,590
Yuma	4,334	-61	4,273	84.0%	3,588
Unknown	609	-9	600	NA	600
Total	157,600	-2,202	155,394	91.7%	143,278

Sources: Arizona Department of Health Services <https://pub.azdhs.gov/health-stats/menu/info/trend/index.php?pg=deaths>, 2018-2022 ACS B05003:

[https://data.census.gov/table?q=b05003&g=040XX00US04\\$0500000](https://data.census.gov/table?q=b05003&g=040XX00US04$0500000) , BGD Estimates

Note: Green represents higher citizenship rates, and red represents lower citizenship rates.

69. There are important differences in the relationship of adult citizen deaths to the number of voters removed from the rolls because of deaths between different counties. In examining total deaths compared to estimated CVAP deaths, there are a variety of outcomes. In the very small Greenlee County, there were 157 removals out of 172 estimated CVAP deaths – a rate of 88%. However in Maricopa County (the largest county in Arizona) for example, there were 58,397 removals out of 75,700 estimated CVAP deaths – a rate of only 77%. See [Table V.C.2](#). Meaning that as many as 17,000 deceased registered voters remained in Maricopa.

Table V.C.2 Total Removals (Any Reason), Voters Removed Because of Death and Estimated CVAP Deaths

Geography	Total Removals (Any Reason)	Removals Because of Death (A)	Estimated CVAP Deaths (B)	# Difference (B) - (A)	% Removed / Estimated (A) / (B)
Apache	3,648	1,740	2,197	457	79.2%
Cochise	15,812	2,638	3,342	704	78.9%
Coconino	9,609	1,778	2,134	356	83.3%
Gila	3,874	1,446	1,951	505	74.1%
Graham	1,247	625	882	257	70.9%
Greenlee	445	157	172	15	91.4%
La Paz	2,194	510	725	215	70.4%
Maricopa	234,151	58,397	75,700	17,303	77.1%
Mohave	17,713	6,309	8,318	2,009	75.8%
Navajo	8,577	2,359	3,413	1,054	69.1%
Pima	71,167	17,079	23,195	6,116	73.6%
Pinal	21,475	6,208	8,800	2,592	70.5%
Santa Cruz	1,350	651	671	20	97.0%
Yavapai	18,442	5,535	7,590	2,055	72.9%
Yuma	22,794	2,671	3,588	917	74.4%
Total	432,498	108,103	143,278	35,175	75.4%

Source: 2022 EAVS, Arizona Department of Health Services, BGD estimates

Note: red represents higher values and green represents lower values. The colors do not convey that an estimate is acceptable or unacceptable, better or worse.

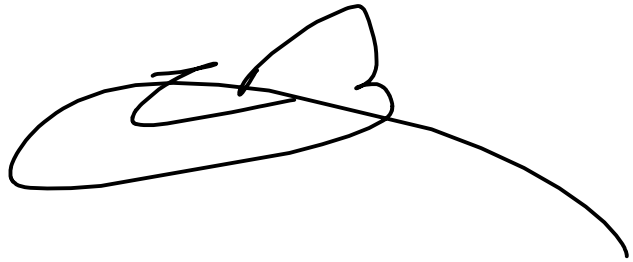
VI. CONCLUSIONS

70. I was asked to analyze the number of voters and voter registration rates for the State of Arizona, and to assess any inconsistencies with generally available information and standard demographic analytic techniques. I did so in three steps. First, I examined the number of registered voters from the State of Arizona and compared them with the Citizen Voting Age Population (CVAP) from the US Census Bureau's American Community Survey (ACS) for the state and individual counties. I then compared the official number of registered voters with the estimated number of registered voters from two of the largest surveys measuring voter registration in the United States: the Current Population Survey (CPS) and the Cooperative Election Study (CES). To the degree there are inconsistencies, I was tasked with analyzing the number of voter removals from the Election Administration and Voting Survey (EAVS), and comparing them with the results of administrative records, vital statistics and demographic analysis for the State of Arizona in an attempt determine sources of these inconsistencies.
71. For the state of Arizona, I find that there are instances where individual counties have statistically significantly more registered voters than CVAP – a logical impossibility. Using the 2018-2022 vintage of the ACS CVAP estimates, I find that there are three counties with more registered voters than CVAP (Apache, La Paz and Santa Cruz) with all three having statistically significantly more registered voters than CVAP. Next, I find that there are significant differences between the number of reported registered voters from the Arizona Secretary of State, and the registered voter statistics reported by the CPS and CES. I have sought to give the State of Arizona's percent registered voter statistic every benefit of the doubt, using the most recent 2022 ACS estimate to support the lowest possible registration rate of 90.8% (see [Table III.B.1](#)). Similarly, I have analyzed the CPS and CES studies to generate the *highest* possible defensible survey-based registration rate, which is 81.4% (CES post-election, see [Table IV.B.1](#)). The smallest difference between 2022 Arizona registered voters (4.833MM) and the national surveys (the 2022 CES post-election, or 4.333MM) is 500K unexplained registered voters. In summary, the information provided by the Arizona Secretary of State differs significantly from the two leading national surveys: the CPS and the CES. If the highest voter registration statistic from an independent survey is 81.4% (knowing that surveys are prone to over-reporting) and the lowest voter registration statistic from the State of Arizona is 90.8% - this suggests the official voter registration statistics for the State of Arizona are inflated.
72. The EAVS dataset provides valuable information on the number of registrants who are removed because of things such as moving, non-response to residence inquires, and deaths. Among these reasons, analyzing the consistency of removal because of death with actual deaths is relatively easy – because the State of Arizona provides the number of deaths for the study period. By adjusting the total number of deaths for the study period downward to account for deaths of minors and non-citizens and non-registrants, I estimate that there were between

130,096 and 143,278 registered voter deaths during the study period. According to EAVS, only 108,103 decedents were removed from Arizona's voter rolls because of deaths – a difference of between about 22,000 to 35,000 more than the number removed because of death. Since these 108,103 removals because of death only account for 25% of the 432,498 total registered voter removals for any reason, the only removal reasons left that are large enough to potentially accommodate these large differences are removals because a registered voter moved out of the jurisdiction or failure to respond to confirmation notices. I conclude that that deficiencies in removals for these other significant reasons, particularly in Maricopa County where confirmation notice data are missing are contributing to the significant difference between Arizona's record of the number of registered voters and the number reported in both the CPS and CES.

* * *

Submitted: May 31, 2024

A handwritten signature in black ink, consisting of a large, stylized loop followed by a long, sweeping horizontal stroke that extends to the right.

Thomas M. Bryan

VII. REFERENCES

- Abramson, Paul R., and William Claggett. 1984. “Race-Related Differences in Self-Reported and Validated Turnout. *Journal of Politics* 46: pp. 719 – 738.
- Abramson, Paul R., and William Claggett. 1986. “Race-Related Differences in Self-Reported and Validated Turnout in 1984. *Journal of Politics* 48: pp. 412 – 422.
- Abramson, Paul R., and William Claggett. 1989. “Race-Related Differences in Self-Reported and Validated Turnout in 1986. *Journal of Politics* 51: pp. 397 – 408.
- Abramson, Paul R., and William Claggett. 1991. “Race-Related Differences in Self-Reported and Validated Turnout in the 1988 Presidential Election. *Journal of Politics* 53: pp. 186 – 197
- Berent, M., J. Krosnick and A. Lupia. 2016. “Measuring Voter Registration and Turnout In Surveys: Do Official Government Records Yield More Accurate Assessments? *The Public Opinion Quarterly*. Vol. 80, No. 3 (Fall 2016), pp. 597-621
- Bernstein, Robert A., A. Chadha and R. Montjoy. 2003. “Cross-State Bias in Voting and Registration Overreporting in the Current Population Surveys” *State Politics & Policy Quarterly* Vol. 3, No. 4 (Winter, 2003), pp. 367-386
- Morrison, P. and T. Bryan (2019). *Redistricting: A Manual for Analysts, Practitioners, and Citizens*. Springer. Cham, Switzerland
- Speilman, S., D. Folch and N. Nagle. (1994), “Patterns and Causes of Uncertainty in the American Community Survey”. *Journal of Applied Geography* January ; 46: 147–157.
- U.S. Census Bureau (2022). *Voting and Registration in the Election of November 2020*. (<https://www.census.gov/content/dam/Census/library/publications/2022/demo/p20-585.pdf>).
- U.S. Census Bureau (2020a). *Understanding and using American Community Survey Data: What all data users need to know*. (https://www.census.gov/content/dam/Census/library/publications/2020/acs/acs_general_handbook_2020.pdf).

VIII. APPENDICES

Appendix 1: Analysis of the impact of calculating voter registration rates using VAP vs. CVAP, and total registered vs. active registered

Appendix 2: Cooperative Election Study (CES) weight calculations

Appendix 3: 2018-2022 ACS VAP and CVAP for Arizona by county

Appendix 4: Thomas Bryan Vitae

Appendix 1: Analysis of the impact of calculating voter registration rates using VAP vs. CVAP, and total registered vs. active registered

There are a variety of ways to calculate voter registration rates. The numerator for calculating voter registration rates could be either *total* registered or *active* registered voters. Active voter registration generally refers to voters who have voted in at least two consecutive federal election cycles prior to the current cycle”³⁶. In their “Best Practices: Voter List Maintenance” report (March, 2023) the US Election Assistance Commission reports “Generally, active voters require no additional processing before they can vote, while inactive voters require address verification before being permitted to vote. The most common reasons for placing a voter on an inactive list according to EAVS include:³⁷

- undeliverable election mail, and
- failure to return a confirmation notice”

For the purposes of this analysis, assessing whether voting rolls are being adequately maintained, one must measure *total* registered voters – including those voters who have not been active, as that lack of voting activity may indicate the need for those voters to be removed from the rolls. In fact, in some states not voting in a series of elections can trigger an automatic process for removing registered voters from the state’s voter rolls. Since Arizona is one of 28 states where not voting does not trigger a removal³⁸, their inactive voters warrant scrutiny and inclusion in a calculation of their voter registration rates. Neither the CPS nor the CES distinguish between active or inactive voter registration in their questionnaire, and their reported numbers are interpreted as representing total registrants. So, if for no other reason, the use of total registered voters in their analysis is by necessity.

It is notable that the Arizona Secretary of State reports “registered voters” who are actually active registered voters on their website - not total registered voters - for the purpose of reporting voter turnout rates.³⁹ Similarly, Maricopa County also reports “registered voters” who are active registered voters - not total registered voters - for the purpose of reporting voter turnout.⁴⁰

³⁶ Source: https://fairvote.org/voter_turnout_behind_the_numbers

³⁷

https://www.eac.gov/sites/default/files/electionofficials/VoterList/Best_Practices_Voter_List_Maintenance_V1_508.pdf

³⁸ <https://tracker.votingrightslab.org/issues/voter-list-maintenance-and-removals?law=54>

³⁹ See <https://azsos.gov/elections/results-data/voter-registration-statistics>, comparing “registered voters” with variables A1a total registered and A1b active registered from the EAVS 2020 and 2022 data series.

⁴⁰ See <https://elections.maricopa.gov/news-and-information/elections-news/maricopa-county-election-results-updated-november-21-2022.html>, comparing “registered voters” with variables A1a total registered and A1b active registered from the EAVS 2020 and 2022 data series.

The denominator for voter registration rates could be either voting age populations (VAP) or the voting eligible population (VEP). While the US Census Bureau presents both in their reporting (see [Table IV.A.1](#) and [Table IV.A.2](#), nationally recognized political science expert Dr. Michael McDonald⁴¹ concludes the population eligible to vote is the most appropriate denominator for a variety of reasons⁴² (see also FN 2). As discussed by Dr. McDonald, using VAP instead of VEP as a denominator would further dilute and distort an accurate measurement of percent registered voters. Dr. McDonald points out that there is one circumstance when using VAP may be necessary as a denominator – which is when polling firms weight their surveys to estimates of VAP.⁴³

With regards to measuring turnout rates, the MIT Election Lab reports “The easiest comparison is with the voting age population (VAP)-that is, the number of people who are 18 and older according to U.S. Census Bureau. However, VAP includes individuals who are ineligible to vote, such as non-citizens and those disfranchised because of felony convictions. Thus, two additional measures of the voting-eligible population have been developed:

- Citizen Voting Age Population (CVAP) , which is based on Census Bureau population estimates generated using the American Community Survey.
- Voting Eligible Population (VEP), which is calculated by removing felons (according to state law), non-citizens, and those judged mentally incapacitated.

The denominator one chooses to calculate the turnout rate depends on the purposes of the analysis and the availability of data. Usually, VEP is the most preferred denominator, followed by CVAP, and then VAP.”⁴⁴

Since there are a relatively small number of felons and incarcerated persons who are ineligible to vote, I do not make an effort to estimate these populations to refine CVAP to a more exclusive vote eligible population (VEP). But doing so would only serve to further reduce the denominator and increase the percent registered even further.

In analyzing the State of Arizona and Maricopa County, Arizona, each different numerator and denominator method results in a dramatically different “voter registration rate”. Using active registered as a numerator would eliminate nearly 700,000 non-active registered voters in the state (see **Table Appendix 1.1**: 4,833,160 – 4,143,929), and 500,000 non-active registered voters in Maricopa County (see **Table Appendix 1.2**: 2,939,138 – 2,435,397). This would have the effect of significantly distorting an analysis of the measurement of percent registered voters.

⁴¹ <https://polisci.ufl.edu/michael-mcdonald/>

⁴² <https://www.electproject.org/election-data/faq/vap-v-vap>

⁴³ <https://www.electproject.org/election-data/faq/vap-v-vap>

⁴⁴ <https://electionlab.mit.edu/research/voter-turnout>

Table Appendix 1.1 and **Table Appendix 1.2** show the outcomes of these different approaches. The method used in this report using CVAP as a denominator and total registered voters as a numerator results in the highest calculated registration rates and are shown in green. Using VAP as a denominator and active registered voters as a numerator results in the lowest calculated registration rates, shown in red. With a nearly 20 percentage point difference between the two, it is critically important that any analysis of voter registration data and comparisons of different sources use the same method.

Table Appendix 1.1 Arizona Percent Registered Voters

State of Arizona Percent Registered by Method		<u>Active Registered</u>	<u>Total Registered</u>
		4,143,929	4,833,160
Citizen Voting Age Population	5,322,581	77.9%	90.8%
Voting Age Population	5,771,594	71.8%	83.7%

Sources:

VAP and CVAP Source: <https://data.census.gov/table/ACSDT1Y2022.B05003?q=b05003%20arizona>

Registered Voter Source: https://www.eac.gov/sites/default/files/2023-06/2022_EAVS_for_Public_Release_V1.xlsx

Table Appendix 1.2 Maricopa County Percent Registered Voters

Maricopa County AZ Percent Registered by Method		<u>Active Registered</u>	<u>Total Registered</u>
		2,435,397	2,939,138
Citizen Voting Age Population	3,218,330	75.7%	91.3%
Voting Age Population	3,532,287	68.9%	83.2%

VAP and CVAP Source:

<https://data.census.gov/table/ACSDT1Y2022.B05003?q=b05003%20maricopa%20county>

Registered Voter Source: https://www.eac.gov/sites/default/files/2023-06/2022_EAVS_for_Public_Release_V1.xlsx

Appendix 2: Cooperative Election Study Weight Calculations

Votereg overview from CES Guide

Voter Registration Status
Are you registered to vote?
 votereg

Voter Registration Status		N
Yes		54354
No		4950
Don't know		696
N		60000

Source: <https://dataverse.harvard.edu/file.xhtml?fileId=7359254&version=4.0>

Are you registered to vote (<i>pre</i> -)			
	4	Arizona State Filter	
	1	Citizen Filter = Yes	
	Sum of Commonweight	% of Commonweight	Count of Commonweight
Yes	1,196	70.9%	1,496
No	455	26.9%	104
DK	37	2.2%	8
	1,688	100.0%	1,608

Source: BGD calculations from 2022 CES,
<https://dataverse.harvard.edu/file.xhtml?fileId=10140882&version=4.0>

Votereg_Post overview from CES Guide

Voter Registration Status post
Are you registered to vote?
 votereg_post

Voter Registration Status post		N
Yes		47511
No		3158
Don't know		312
N		50981

Source: <https://dataverse.harvard.edu/file.xhtml?fileId=7359254&version=4.0>

Are you registered to vote (<i>post</i> -)			
	4	Arizona State Filter	
	1	Citizen Filter = Yes	
	Sum of CommonPostweight	% of CommonPostweight	Count of CommonPostweight
Yes	1,155	81.4%	1,322
No	236	16.6%	55
DK	28	2.0%	6
	1,419	100.0%	1,383

Source: BGD calculations from 2022 CES,
<https://dataverse.harvard.edu/file.xhtml?fileId=10140882&version=4.0>

Appendix 3: 2018-2022 ACS VAP and CVAP for Arizona by County Used to Adjust Adult Deaths downward to Adult Citizen Deaths

Geography	VAP	CVAP	# Diff	#CVAP of VAP
Arizona	5,578,819	5,118,553	460,266	91.7%
Apache	48,529	48,085	444	99.1%
Cochise	99,006	94,116	4,890	95.1%
Coconino	115,926	111,990	3,936	96.6%
Gila	43,072	42,340	732	98.3%
Graham	28,345	27,942	403	98.6%
Greenlee	6,894	6,746	148	97.9%
La Paz	13,973	12,681	1,292	90.8%
Maricopa	3,406,731	3,079,626	327,105	90.4%
Mohave	178,795	172,944	5,851	96.7%
Navajo	79,341	78,419	922	98.8%
Pima	831,676	775,517	56,159	93.2%
Pinal	337,913	317,927	19,986	94.1%
Santa Cruz	35,237	28,834	6,403	81.8%
Yavapai	200,350	192,907	7,443	96.3%
Yuma	153,031	128,479	24,552	84.0%

Source: <https://data.census.gov/all?q=b05003>

Note: red represents higher values and green represents lower values. The colors do not convey that an estimate is acceptable or unacceptable, better or worse.

Appendix 4: Thomas Bryan Vitae

Introduction

I am an applied demographic, analytic and research professional who leads a team of bipartisan experts in state and local redistricting cases and assessments of voting strength. I have subject matter expertise in political and school redistricting and Voting Rights Act related litigation, US Census Bureau data, geographic information systems (GIS), applied demographic techniques and advanced analytics.

Current appointee to the 2030 Census Advisory Committee (CAC)

- <https://www.census.gov/about/cac/2030cac.html>
- <https://www.census.gov/newsroom/bios/thomas-bryan.html>

Education & Academic Honors

2002 MS, Management and Information Systems - George Washington University

2002 GSA CIO University graduate - George Washington University

1997 Graduate credit courses taken at University of Nevada at Las Vegas

1996 MUS (Master of Urban Studies) Demography and Statistics core - Portland State University

1992 BS, History - Portland State University

Online

BGD company website: <https://www.bryangeodemo.com/>

ResearchGate: <https://www.researchgate.net/profile/Thomas-Bryan-6>

LinkedIn: <https://www.linkedin.com/in/thomas-bryan-424a6912>

Bryan GeoDemographics, January 2001-Current: Founder and President

I founded Bryan GeoDemographics (BGD) in 2001 as a demographic and analytic consultancy to meet the expanding demand for advanced analytic expertise in applied demographic research and analysis. Since then, my consultancy has broadened to include expert support of political, state, local and school redistricting and voting strength analysis. Since 2001, BGD has undertaken over 150 such engagements in two broad areas:

- 1) state and local redistricting; and
- 2) applied demographic studies, including health sciences and municipal Infrastructure

The core of the BGD consultancy has been in state and local redistricting and bipartisan expert witness support of litigation and voting strength assessments. Engagements include:

Redistricting

- In the matter of *Jessica Garcia Shafer and Dona Kim Murphey v. Pearland Independent School District, et al.* in US District Court for the Southern District of Texas. Providing expert demographic and analytic litigation support to Defendants.
 - <https://dockets.justia.com/docket/texas/txsdce/3:2022cv00387/1894835>
- In the matter of *Grace, Inc. v. City of Miami* in U.S. District Court for the Southern District of Florida. Providing expert demographic and analytic litigation support to Defendants.
 - <https://thearp.org/litigation/grace-inc-v-city-miami/>
- 2023: In the matter of *Navajo Nation v. San Juan County Board of Commissioners* in the US District Court for the District of New Mexico. Providing expert demographic and analytic litigation support to Defendants. Deposed in May 2023.
 - <https://dockets.justia.com/docket/new-mexico/nmdce/1:2022cv00095/470450>
- 2022: In the matter of *White v. Mississippi State Board of Election Commissioners* in United States District Court, Northern District of MS In collaboration with demographic testifying expert Dr. David Swanson, on behalf of Defendants. Provided expert demographic and analytic litigation support of MS Supreme Court redistricting litigation.
 - <https://www.aclu-ms.org/en/cases/white-v-mississippi-board-election-commissioners>
- 2022: Retained as demographic and redistricting expert for the Louisiana Attorney General in *Robinson v. Ardoin* and *Galmon v. Ardoin* and related Louisiana redistricting litigation. Offering opinions on demography and redistricting for their congressional redistricting plan and Plaintiff's proposed illustrative plans as a testifying expert. My testimony and analysis were not credited in the court's decision.

- <https://news.ballotpedia.org/2022/04/04/louisiana-enacts-new-congressional-district-boundaries-after-legislature-overrides-governors-veto/>
- 2022: Retained by counsel as demographic and redistricting expert for the Kansas Legislature in support of *Rivera et al. v Schwab* litigation. Kansas Supreme Court found in favor of Kansas Legislature plan on June 21, 2022.
 - <https://thearp.org/litigation/rivera-v-schwab/>
 - https://www.kscourts.org/KSCourts/media/KsCourts/Opinions/125092_1.pdf?ext=.pdf
- 2022: Retained by counsel as demographic and redistricting expert for the State of Michigan in the matter of *Banerian v. Benson* and related Michigan redistricting litigation. Offering opinions on demography and redistricting for Michigan’s Congressional redistricting plan. Currently before SCOTUS pending jurisdictional statement.
 - <https://www.scotusblog.com/case-files/cases/banerian-v-benson/>
- 2021: Retained as demographic and redistricting expert for the Wisconsin Legislature in *Johnson v. Wisconsin Elections Commission*, No. 2021AP001450-OA (Wis. Supreme Court) and related Wisconsin redistricting litigation. Offering opinions on demography and redistricting for redistricting plans proposed as remedies in impasse suit. The Wisconsin Supreme Court decided in favor of the Democratic Governor’s plan on March 2, 2022. The case continues to be litigated.
 - <https://www.wpr.org/us-supreme-court-rejects-legislative-map-drawn-evers-was-endorsed-wisconsin-supreme-court>
 - <https://www.nytimes.com/2022/04/15/us/wisconsin-districts-gerrymander-supreme-court.html>
- 2021: Retained as demographic and redistricting expert by counsel for Galveston County, TX. Galveston County, TX was later sued by the US Department of Justice (*Petteway v. Galveston County, Texas*). Testified before U.S. District Judge Jeffrey Vincent Brown, who found for the Plaintiffs. Judge Brown said of my testimony “the court credits Bryan – an eminently believable witness” and that I “testified credibly”. Defendants appealed to SCOTUS who reviewed the case in December in 2023 and refused to intervene. The case will continue in 2024 before the 5th Circuit Court.
 - <https://thearp.org/litigation/united-states-v-galveston-county-tex/>
 - <https://www.scotusblog.com/2023/12/supreme-court-wont-block-new-maps-for-galveston-county/>

- 2021: Retained as demographic and redistricting expert by the State of Alabama Attorney General's office in the matters of *Milligan v. Merrill*, *Thomas v. Merrill* and *Singleton v. Merrill* over Alabama's Congressional redistricting initiatives. My testimony and analysis were not credited in the court's decision.
- 2021: Retained as nonpartisan demographic and redistricting expert by counsel in the State of North Carolina to prepare commissioner redistricting plans for Granville County, Harnett County, Jones County and Nash County. Each proposed plan was approved and successfully adopted.
- 2021: Served as Consultant to the Arizona Independent Redistricting Commission, presenting "Pros and Cons of (Census data) Differential Privacy". July 13, 2021.
 - <https://irc.az.gov/sites/default/files/meeting-agendas/Agenda%207.13.21.pdf>
- 2021: Retained as demographic and redistricting expert by Democratic Counsel for the State of Illinois in the case of *McConchie v. State Board of Elections*. Prepared expert report in defense of using the American Community Survey to comply with state constitutional
 - <https://redistricting.ils.edu/case/mcconchie-v-ill-state-board-of-elections/>.
- 2021: Retained by counsel for the Chairman and staff of the Texas House Committee on Redistricting as a consulting demographic expert. Texas House Bill 1 subsequently passed by the Legislature 83-63.
 - <https://capitol.texas.gov/BillLookup/History.aspx?LegSess=873&Bill=HB1>
- 2021: In the matter of the *State of Alabama, Representative Robert Aderholt, William Green and Camaran Williams v. the US Department of Commerce; Gina Raimondo; the US Census Bureau and Ron Jarmin* in US District Court of Alabama Eastern Division. Prepared a demographic report for Plaintiffs analyzing the effects of using Differential Privacy on Census Data in Alabama and was certified as an expert witness by the Court.
 - <https://www.alabamaag.gov/Documents/news/Census%20Data%20Manipulation%20Lawsuit.pdf>
 - <https://www.courtlistener.com/docket/59728874/3/6/the-state-of-alabama-v-united-states-department-of-commerce/>
- 2020: In the matter of *The Christian Ministerial Alliance (CMA), Arkansas Community Institute v. the State of Arkansas*. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support.

- [https://www.naacpldf.org/wp-content/uploads/CMA-v.-Arkansas FILED-without-stamp.pdf](https://www.naacpldf.org/wp-content/uploads/CMA-v.-Arkansas%20FILED-without-stamp.pdf)
- 2020: In the matter of *Aguilar, Gutierrez, Montes, Palmer and OneAmerica v. Yakima County* in Superior Court of Washington under the Washington Voting Rights Act (“WVRA” Wash. Rev. Code § 29A.92.60). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support.
 - <https://bloximages.newyork1.vip.townnews.com/yakimaherald.com/content/tncms/assets/v3/editorial/a/4e/a4e86167-95a2-5186-a86c-bb251bf535f1/5f0d01eec8234.pdf.pdf>
- 2018-2020: In the matter of *Rene Flores, Maria Magdalena Hernandez, Magali Roman, Make the Road New York, and New York Communities for Change v. Town of Islip, Islip Town Board, Suffolk County Board of Elections* in US District Court. On behalf of Defendants - provided a critical analysis of plaintiff’s demographic and environmental justice analysis. The critique revealed numerous flaws in both the demographic analysis as well as the tenets of their environmental justice argument, which were upheld by the court. Ultimately developed mutually agreed upon plan for districting.
 - <https://nyelectionsnews.wordpress.com/2018/06/20/islip-faces-section-2-voting-rights-act-challenge/>
 - <https://casetext.com/case/flores-v-town-of-islip-3>
- 2017-2020 In the matter of *NAACP, Spring Valley Branch; Julio Clerveaux; Chevon Dos Reis; Eric Goodwin; Jose Vitelio Gregorio; Dorothy Miller; and Hillary Moreau v East Ramapo Central School District (Defendant)* in United States District Court Southern District Of New York (original decision May 25, 2020), later the U.S. Second Circuit Court of Appeals. On behalf of Defendants, developed mutually agreed upon district plan and provided demographic and analytic litigation support.
 - <https://www.lohud.com/story/news/education/2020/05/26/federal-judge-sides-naacp-east-ramapo-voting-rights-case/5259198002/>
- 2017-2020: In the matter of *Pico Neighborhood Association et al v. City of Santa Monica* brought under the California VRA. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Providing demographic and analytic litigation support. Executed geospatial analysis to identify concentrations of Hispanic and Black CVAP to determine the impossibility of creating a minority majority district, and demographic analysis to show the dilution of Hispanic and Black voting strength in a district (vs at-large)

system. Work contributed to Defendants prevailing in landmark ruling in the State of California Court of Appeal, Second Appellate District.

- <https://www.santamonica.gov/press/2020/07/09/santa-monica-s-at-large-election-system-affirmed-in-court-of-appeal-decision>
- 2019: In the matter of *Johnson v. Ardoin / the State of Louisiana* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - https://www.brennancenter.org/sites/default/files/2019-10/2019-10-16-Johnson%20v_%20Ardoin-132-Brief%20in%20Opposition%20to%20MTS.pdf
 - <https://casetext.com/case/johnson-v-ardoin>
- 2019: In the matter of *Suresh Kumar v. Frisco Independent School District et al.* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support. Successfully defended.
 - <https://www.friscoisd.org/news/district-headlines/2020/08/04/frisco-isd-wins-voting-rights-lawsuit>
 - <https://www.courthousenews.com/wp-content/uploads/2020/08/texas-schools.pdf>
- 2019: At the request of the City of Frisco, TX in collaboration with demographic testifying expert Dr. Peter Morrison. Provided expert demographic assessment of the City's potential liability regarding a potential Section 2 Voting Rights challenge.
- 2019: In the matter of *Vaughan v. Lewisville Independent School District et al.* in United States District Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - <https://www.nbcdfw.com/news/local/lawsuit-filed-against-lewisville-independent-school-district/1125/>
- 2019: In the matter of *Holloway, et al. v. City of Virginia Beach* in United States District Court, Eastern District of Virginia. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided expert demographic and analytic litigation support.
 - <https://campaignlegal.org/cases-actions/holloway-et-al-v-city-virginia-beach>
- 2018: At the request of Kirkland City, Washington in collaboration with demographic testifying expert Dr. Peter Morrison. Performed demographic studies to inform the City's

governing board's deliberations on whether to change from at-large to single-member district elections following enactment of the Washington Voting Rights Act. Analyses included gauging the voting strength of the City's Asian voters and forming an illustrative district concentrating Asians; and compared minority population concentration in pre- and post-annexation city territory.

- https://www.kirklandwa.gov/Assets/City+Council/Council+Packets/021919/8b_SpecialPresentations.pdf#:~:text=RECOMMENDATION%3A%20It%20is%20recommended%20that%20City%20Council%20receive,its%20Councilmembers%20on%20a%20citywide%2C%20at-%20large%20basis
- 2018: At the request of Tacoma WA Public Schools in collaboration with demographic testifying expert Dr. Peter Morrison. Created draft concept redistricting plans that would optimize minority population concentrations while respecting incumbency. Client used this plan as a point of departure for negotiating final boundaries among incumbent elected officials.
- 2018: At the request of the City of Mount Vernon, Washington., in collaboration with demographic testifying expert Dr. Peter Morrison. Prepared a numerous draft concept plans that preserves Hispanics' CVAP concentration. Client utilized draft concept redistricting plans to work with elected officials and community to agree upon the boundaries of six other districts to establish a proposed new seven-district single-member district plan.
- 2017: In the matter of *Pico Neighborhood Association v. City of Santa Monica*. In collaboration with demographic testifying expert Dr. Peter Morrison. Worked to create draft district concept plans that would satisfy Plaintiff's claim of being able to create a majority-minority district to satisfy Gingles prong 1. Such district was not possible, and the Plaintiffs case ultimately failed in California State Court of Appeals Second Appellate District.
 - <https://law.justia.com/cases/california/court-of-appeal/2020/b295935.html>
- 2017: In the matter of *John Hall, Elaine Robinson-Strayhorn, Lindora Toudle, Thomas Jerkins, v. Jones County Board of Commissioners*. In collaboration with demographic testifying expert Dr. Peter Morrison. Worked to create draft district concept plans to resolve claims of discrimination against African Americans attributable to the existing at-large voting system.
 - <http://jonescountync.gov/vertical/sites/%7B9E2432B0-642B-4C2F-A31B-CDE7082E88E9%7D/uploads/2017-02-13-Jones-County-Complaint.pdf>
- 2017: In the matter of *Harding v. County of Dallas* in U.S. District Court. In collaboration with demographic testifying expert Dr. Peter Morrison. In a novel case alleging discrimination

against White, non-Hispanics under the VRA, I was retained by plaintiffs to create redistricting scenarios with different balances of White-non-Hispanics, Blacks and Hispanics. Deposed and provided expert testimony on the case.

- <https://www.courthousenews.com/wp-content/uploads/2018/08/DallasVoters.pdf>
- 2016: Retained by The Equal Voting Rights Institute to evaluate the Dallas County Commissioner existing enacted redistricting plan. In collaboration with demographic testifying expert Dr. Peter Morrison, the focus of our evaluation was twofold: (1) assess the failure of the Enacted Plan (EP) to meet established legal standards and its disregard of traditional redistricting criteria; (2) the possibility of drawing an alternative Remedial Plan (RP) that did meet established legal standards and balance traditional redistricting criteria.
 - <http://equalvotingrights.org/wp-content/uploads/2015/01/Complaint.pdf>
- 2016: In the matter of *Jain v. Coppell ISD et al* in US District Court (Texas). In collaboration with demographic testifying expert Dr. Peter Morrison. Consulted in defense of Coppell Independent School District (Dallas County, TX) to resolve claims of discriminatory at-large voting system affecting Asian Americans. While Asians were shown to be sufficiently numerous, I was able to demonstrate that they were not geographically concentrated - thus successfully proving the Gingles 1 precondition could not be met resulting the complaint being withdrawn.
 - <https://dockets.justia.com/docket/texas/txndce/3:2016cv02702/279616>
- 2016: In the matter of *Feldman et al v. Arizona Secretary of State's Office et al* in SCOTUS. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided analytics on the locations and proximal demographics of polling stations that had been closed subsequent to *Shelby County v. Holder* (2013) which eliminated the requirement of state and local governments to obtain federal preclearance before implementing any changes to their voting laws or practices. Subsequently provided expert point of view on disparate impact as a result of H.B. 2023. Advised Maricopa County officials and lead counsel on remediation options for primary polling place closures in preparation for 2016 elections.
 - <https://arizonadailyindependent.com/2016/04/05/doj-wants-information-on-maricopa-county-election-day-disaster/>
 - https://www.supremecourt.gov/DocketPDF/19/19-1257/142431/20200427105601341_Brnovich%20Petition.pdf

- 2016: In the matter of *Glatt v. City of Pasco, et al.* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Provided analytics and draft plans in defense of the City of Pasco. One draft plan was adopted, changing the Pasco electoral system from at-large to a six-district + one at large.
 - <https://www.pasco-wa.gov/DocumentCenter/View/58084/Glatt-v-Pasco---Order---January-27-2017?bidId=>
 - <https://www.pasco-wa.gov/923/City-Council-Election-System>
- 2015: In the matter of *The League of Women Voters et al. v. Ken Detzner et al* in the Florida Supreme Court. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Performed a critical review of Florida state redistricting plan and developed numerous draft concept plans.
 - <http://www.miamiherald.com/news/politics-government/state-politics/article47576450.html>
 - https://www.floridasupremecourt.org/content/download/322990/2897332/file/OP-SC14-1905_LEAGUE%20OF%20WOMEN%20VOTERS_JULY09.pdf
- 2015: In the matter of *Evenwel, et al. v. Abbott / State of Texas* in SCOTUS. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Plaintiffs. Successfully drew map for the State of Texas balancing both total population from the decennial census and citizen population from the ACS (thereby proving that this was possible). We believe this may be the first and still only time this technical accomplishment has been achieved in the nation at a state level. Coauthored SCOTUS Amicus Brief of Demographers.
 - https://www.supremecourt.gov/opinions/15pdf/14-940_ed9g.pdf
 - <https://www.scotusblog.com/wp-content/uploads/2015/08/Demographers-Amicus.pdf>
- 2015: In the matter of *Ramos v. Carrollton-Farmers Branch Independent School District* in US District Court (Texas). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Used 2009-2013 5-year ACS data to generate small-area estimates of minority citizen voting age populations and create a variety of draft concept redistricting plans. Case was settled decision in favor of a novel cumulative voting system.
 - https://starlocalmedia.com/carrolltonleader/c-fb-isd-approves-settlement-in-voting-rights-lawsuit/article_92c256b2-6e51-11e5-adde-a70cbe6f9491.html

- 2015: In the matter of *Glatt v. City of Pasco et al.* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Consulted on forming new redistricting plan for city council review. One draft concept plan was agreed to and adopted.
 - <https://www.pasco-wa.gov/923/City-Council-Election-System>
- 2015: At the request of Waterbury, Connecticut, in collaboration with demographic testifying expert Dr. Peter Morrison. As a result of a successful ballot measure to convert Waterbury from an at-large to a 5-district representative system, consulted an extensive public outreach and drafted numerous concept plans. The Waterbury Public Commission considered alternatives and recommended one of our plans, which the City adopted.
 - <http://www.waterburyobserver.org/wod7/node/4124>
- 2014-15: In the matter of *Montes v. City of Yakima* in US District Court (Washington). In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants. Analytics later used to support the Amicus Brief of the City of Yakima, Washington in the U.S. Supreme Court in *Evenwel v. Abbott*.
 - <https://casetext.com/case/montes-v-city-of-yakima-3>
- 2014: In the matter of *Harding v. County of Dallas* in the US Court of Appeals Fifth Circuit. In the novel case of Anglo plaintiffs attempting to claim relief as protected minorities under the VRA. Served as demographic expert in the sole and limited capacity of proving Plaintiff claim under Gingles prong 1. Claim was proven. Gingles prongs 2 and 3 were not and the case failed.
 - <https://electionlawblog.org/wp-content/uploads/Dallas-opinion.pdf>
- 2014: At the request of Gulf County, Florida in collaboration with demographic testifying expert Dr. Peter Morrison. Upon the decision of the Florida Attorney General to force inclusion of prisoners in redistricting plans – drafted numerous concept plans for the Gulf County Board of County Commissioners, one of which was adopted.
 - <http://myfloridalegal.com/ago.nsf/Opinions/B640990E9817C5AB85256A9C00631387>
- 2012-2015: In the matter of *GALEO and the City of Gainesville* in Georgia. In collaboration with demographic testifying expert Dr. Peter Morrison, on behalf of Defendants -consulted on defense of existing at-large city council election system.
 - <http://atlantaprogressivenews.com/2015/06/06/galeo-challenges-at-large-voting-in-city-of-gainesville/>

- 2012-: Confidential. Consulted (through Morrison & Associates) to support plan evaluation, litigation, and outreach to city and elected officials (1990s - mid-2000s). Executed first statistical analysis of the American Community Survey to determine probabilities of minority-majority populations in split statistical/administrative units of geography, as well as the cumulative probabilities of a “false-negative” minority-majority reading among multiple districts.
- 2011-: Confidential. Consulted on behalf of plaintiffs in Committee (Private) vs. State Board of Elections pertaining to citizen voting-age population. Evaluated testimony of defense expert, which included a statistical evaluation of Hispanic estimates based on American Community Survey (ACS) estimates. Analysis discredited the defendant’s expert’s analysis and interpretation of the ACS.

The remainder of this page intentionally left blank

School Redistricting and Municipal Infrastructure Projects

BGD worked with McKibben Demographics from 2004-2012 providing expert demographic and analytic support. These engagements involved developing demographic profiles of small areas to assist in building fertility, mortality and migration models used to support long-range population forecasts and infrastructure analysis in the following communities:

Fargo, ND 10/2012	Charleston, SC 8/08
Columbia, SC 3/2012	Woodland, IL 7/08
Madison, MS 9/2011	White County, IN 6/08
Rockwood, MO 3/2011	Gurnee District 56, IL 5/08
Carthage, NY 3/2011	Central Noble, IN 4/08
NW Allen, IN 9/2010	Charleston First Baptist, SC 4/08
Fayetteville, AR 7/2010	Edmond, OK 4/08
Atlanta, GA 2/2010	East Noble, IN 3/08
Caston School Corp., IN 12/09	Mill Creek, IN 5/06
Rochester, IN 12/09	Rhode Island 5/06
Urbana, IL 11/09	Garrett, IN 3/08
Dekalb, IL 11/09	Meridian, MS 3/08
Union County, NC 11/09	Madison County, MS 3/08
South Bend, IN 8/09	Charleston 12/07
Lafayette, LA 8/09	Champaign, IL 11/07
Fayetteville, AR 4/09	Richland County, SC 11/07
New Orleans, LA 4/09	Lake Central, IN 11/07
Wilmington New Hanover 3/09	Columbia, SC 11/07
New Berry, SC 12/08	Duneland, IN 10/07
Corning, NY 11/08	Union County, NC 9/07
McLean, IL 11/08	Griffith, IN 9/07
Lakota 11/08	Rensselaer, IN 7/07
Greensboro, NC 11/08	Hobart, IN 7/07
Guilford 9/08	Buffalo, NY 7/07
Lexington, SC 9/08	Oak Ridge, TN 5/07
Plymouth, IN 9/08	Westerville, OH 4/07

Projects Continued

Baton Rouge, LA 4/07
 Cobb County, GA 4/07
 Charleston, SC District 20 4/07
 McDowell County, NC 4/07
 East Allen, IN 3/07
 Mt. Pleasant, SC District 2 2/07
 Peach County, GA 2/07
 North Charleston, SC District 4 2/07
 Madison County, MS revisions 1/07
 Portage County, IN 1/07
 Marietta, GA 1/07
 Porter, IN 12/06
 Harrison County, MS 9/06
 New Albany/Floyd County, IN 9/06
 North Charleston, SC 9/06
 Fairfax, VA 9/06
 Coleman 8/06
 DeKalb, GA 8/06
 LaPorte, IN 7/06
 NW Allen, IN 7/06
 Brunswick, NC 7/06
 Carmel Clay, IN 7/06
 Calhoun, SC 5/06
 Hamilton Community Schools, IN 4/06
 Dilworth, MN 4/06
 Hamilton, OH 2/06
 West Noble, IN 2/06
 New Orleans, LA 2/06
 Norwell, IN 2/06
 Middletown, OH 12/05
 West Noble, IN 11/05
 Madison, MS 11/05
 Fremont, IN 11/05
 Concord, IN 11/05

Allen County 11/05
 Bremen, IN 11/05
 Smith Green, IN 11/05
 Steuben, IN 11/05
 Plymouth, IN 11/05
 North Charleston, SC 11/05
 Huntsville, AL 10/05
 Dekalb, IN 9/05
 East Noble, IN 9/05
 Valparaiso, IN 6/05
 Penn-Harris-Madison, IN 7/05
 Elmira, NY 7/05
 South Porter/Merriville, IN 7/05
 Fargo, ND 6/05
 Washington, IL 5/05
 Addison, NY 5/05
 Kershaw, SC 5/05
 Porter Township, IN 3/05
 Portage, WI 1/05
 East Stroudsburg, PA 12/04
 North Hendricks, IN 12/04
 Sampson/Clinton, NC 11/04
 Carmel Clay Township, IN 9/04
 SW Allen County, IN 9/04
 East Porter, IN 9/04
 Allen County, IN 9/04
 Duplin, NC 9/04
 Hamilton County / Clay TSP, IN 9/04
 Hamilton County / Fall Creek TSP, IN 9/04
 Decatur, IN 9/04
 Chatham County / Savannah, GA 8/04
 Evansville, IN 7/04
 Madison, MS 7/04
 Vanderburgh, IN 7/04
 New Albany, IN 6/04

Publications

- "Using Cluster Analysis to Identify Communities of Interest for Purposes of Legislative Redistricting: A Case study of Parishes in Louisiana" *Papers in Applied Geography* (with David A. Swanson). Forthcoming.
- "Forensic Demography: An Overlooked Area of Practice among Applied Demographers" *Review of Economics and Finance* (with David A. Swanson and Jeff Tayman). January 2023.
 - <https://refpress.org/ref-vol20-a94/>
- In the matter of *Banerian v. Benson*, No. 1:22-CV-00054-RMK-JTN-PLM, in US District Court of the Western District of Michigan. Declaration of Thomas Bryan. Assessing the performance of plaintiff and defendant plans against the Michigan Constitution and traditional redistricting principles. February 2022.
- In the matter of *Johnson v. Wisconsin Elections Commission*, No. 2021AP0014500A, in the Supreme Court of Wisconsin. Declaration and Rebuttal Declaration of Thomas M. Bryan. Assessing the features of proposed redistricting plans by the Wisconsin Legislature and other parties to the litigation. December 2021.
- In the matters of *Caster v. Merrill* and *Milligan v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NOs. 2:21-cv-01536-AMM; 2:21-cv-01530-AMM. Declaration of Thomas Bryan. Assessing the compliance and performance of the demonstrative VRA congressional plans of Dr. Moon Duchin and Mr. William Cooper. December 2021.
- In the matter of *Milligan v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NO. 2:21-cv-01530-AMM. Declaration of Thomas M. Bryan. Assessing the compliance and performance of the Milligan and State of Alabama congressional redistricting plans. December 2021.
- In the matter of *Singleton v. Merrill* in US District Court of the Northern District of Alabama. Civil Action NO. 2:21-cv-01291-AMM. Declaration of Thomas M. Bryan. Assessing the compliance and performance of the Singleton and State of Alabama congressional redistricting plans. December 2021.
- "The Effect of the Differential Privacy Disclosure Avoidance System Proposed by the Census Bureau on 2020 Census Products: Four Case Studies of Census Blocks in Alaska" PAA Affairs,

(with D. Swanson and Richard Sewell, Alaska Department of Transportation and Public Facilities). March 2021.

- <https://www.populationassociation.org/blogs/paa-web1/2021/03/30/the-effect-of-the-differential-privacy-disclosure>
- <https://redistrictingonline.org/2021/03/31/study-census-bureaus-differential-privacy-disclosure-avoidance-system-produces-concerning-results-for-local-jurisdictions/>
- <https://www.ncsl.org/research/redistricting/differential-privacy-for-census-data-explained.aspx>
- In the matter of the *State of Alabama, Representative Robert Aderholt, William Green and Camaran Williams v. the US Department of Commerce; Gina Raimondo; the US Census Bureau and Ron Jarmin* in US District Court of Alabama Eastern Division. Declaration of Thomas M. Bryan, Exhibit 6. Civil Action NO. 3:21-CV-211, United States District Court for Middle Alabama, Eastern Division. Assessing the impact of the U.S. Census Bureau’s approach to ensuring respondent privacy and Title XIII compliance by using a disclosure avoidance system involving differential privacy. March 2021.
 - <https://redistricting.lls.edu/wp-content/uploads/AL-commerce2-20210311-Pl.zip>
 - <https://www.alabamaag.gov/Documents/news/Census%20Data%20Manipulation%20Lawsuit.pdf>
 - <https://www.courtlistener.com/docket/59728874/3/6/the-state-of-alabama-v-united-states-department-of-commerce/>
- Peter A. Morrison and Thomas M. Bryan, Redistricting: A Manual for Analysts, Practitioners, and Citizens (2019). Springer Press: Cham Switzerland.
 - <https://link.springer.com/book/10.1007/978-3-030-15827-9>
- “From Legal Theory to Practical Application: A How-To for Performing Vote Dilution Analyses.” *Social Science Quarterly*. (with M.V. Hood III and Peter Morrison). March 2017
- In the Supreme Court of the United States *Sue Evenwel, Et Al., Appellants, V. Greg Abbott, in his official capacity as Governor of Texas, et al., Appellees. On appeal from the United States District Court for the Western District of Texas. Amicus Brief of Demographers Peter A. Morrison, Thomas M. Bryan, William A. V. Clark, Jacob S. Siegel, David A. Swanson, and The Pacific Research Institute - As amici curiae* in support of Appellants. August 2015.
 - www.scotusblog.com/wp-content/uploads/2015/08/Demographers-Amicus.pdf

- Workshop on the Benefits (and Burdens) of the American Community Survey, Case Studies/Agenda Book 6 “Gauging Hispanics’ Effective Voting Strength in Proposed Redistricting Plans: Lessons Learned Using ACS Data.” June 14–15, 2012
 - <http://docplayer.net/8501224-Case-studies-and-user-profiles.html>
- “Internal and Short Distance Migration” by Bryan, Thomas in J. Siegel and D. Swanson (eds.) The Methods and Materials of Demography, Condensed Edition, Revised. (2004). Academic/Elsevier Press: Los Angeles (with D. Swanson and P. Morrison).
- “Population Estimates” by Bryan, Thomas in J. Siegel and D. Swanson (eds.) The Methods and Materials of Demography, Condensed Edition, Revised. (2004). Academic/Elsevier Press: Los Angeles (with D. Swanson and P. Morrison).
- Bryan, T. (2000). U.S. Census Bureau Population estimates and evaluation with loss functions. *Statistics in Transition*, 4, 537–549.

The rest of this page intentionally left blank

Professional Presentations and Conference Participation

- 2024 “Use of Current Population Survey and Cooperative Election Study in Analyzing Registered Voter Turnout”. Scheduled for June 5, 2024 at the American Statistical Association Symposium on Data Science and Statistics (SDSS) meetings, Richmond, VA.
- 2024 Uses of Demographic Data and Statistical Information Systems in Redistricting and Litigating Voting Rights Act Cases: Case studies of the CPS and CES, and the ACS and EAVS. Presented at the 2024 Population Association of America Applied Demography Conference, February 2024.
 - <https://events.rdmobile.com/Sessions/Details/2193084>
- 2023 Population Association of America Applied Demography Conference, Annapolis, MD. February 2023.
 - <https://events.rdmobile.com/Sessions/Details/2193084>
 - “Applications of Differential Core Retention in Redistricting”
 - “Census CVAP vs. VAP in a Redistricting Context”
 - “Different Census Race Definitions in a Redistricting Context”
- 2022 Southern Demographic Association Meetings. “Census 2020 and Political Redistricting” session. Knoxville, TN, October 2022.
 - https://sda-demography.org/resources/Documents/SDA%202022%20Preliminary%20ProgramVfinal_V12.pdf
 - “Addressing Latent Demographic Factors in Redistricting: An Instructional Case” (with Dr. Peter Morrison)
- “Analysis of Differential Privacy and its Impacts on Redistricting” Presented as invited expert on the Panel on the 2020 Census at the American Statistical Association JSM meetings, Washington DC August 8, 2022.
 - <https://ww2.amstat.org/meetings/jsm/2022/onlineprogram/AbstractDetails.cfm?abstractid=323887>
- “Re-purposing Record Matching Algorithms to assess the effect of Differential Privacy on 2020 Small Area Census Data” SAE 2022: Small Area Estimation, Surveys and Data Science University of Maryland, College Park, USA 23 - 27 May, 2022. With Dr. David Swanson.
 - <https://sae2022.org/program>
- “Redistricting 101: A Tutorial” 2022 Population Association of America Applied Demography Conference, February 2022. With Dr. Peter Morrison.
 - <https://www.populationassociation.org/paa2022/home>

- “The Effect of the Differential Privacy Disclosure Avoidance System Proposed by the Census Bureau on 2020 Census Products: Four Case Studies of Census Blocks in Alaska”. 2021 American Statistical Association - Symposium on Data Science and Statistics (ASA-SDSS). With Dr. David Swanson.
 - <https://ww2.amstat.org/meetings/sdss/2021/index.cfm>
- “New Technical Challenges in Post-2020 Redistricting” 2020 Population Association of America Applied Demography Conference, 2020 Census Related Issues, February 2021. With Dr. Peter Morrison.
- “Tutorial on Local Redistricting” 2020 Population Association of America Applied Demography Conference, February 2021. With Dr. Peter Morrison.
- “Demographic Constraints on Minority Voting Strength in Local Redistricting Contexts” 2019 Southern Demographic Association meetings (coauthored with Dr. Peter Morrison) New Orleans, LA, October 2019. Winner of annual E. Walter Terrie award for best state and local demography presentation.
 - <http://sda-demography.org/2019-new-orleans>
- “Applications of Big Demographic Data in Running Local Elections” 2017 Population and Public Policy Conference, Houston, TX.
- “Distinguishing ‘False Positives’ Among Majority-Minority Election Districts in Statewide Congressional Redistricting,” 2017 Southern Demographic Association meetings (coauthored with Dr. Peter Morrison) Morgantown, WV.
- “Devising a Demographic Accounting Model for Class Action Litigation: An Instructional Case” 2016 Southern Demographic Association (with Peter Morrison), Athens, GA.
- “Gauging Hispanics’ Effective Voting Strength in Proposed Redistricting Plans: Lessons Learned Using ACS Data.” 2012 Conference of the Southern Demographic Association, Williamsburg, VA.
- “Characteristics of the Arab-American Population from Census 2000 and 1990: Detailed Findings from PUMS.” 2004 Conference of the Southern Demographic Association, (with Samia El-Badry) Hilton Head, SC.
- “Small-Area Identification of Arab American Populations,” 2004 Conference of the Southern Demographic Association, Hilton Head, SC.
- “Applied Demography in Action: A Case Study of Population Identification.” 2002 Conference of the Population Association of America, Atlanta, GA.

Professional Conference Chairs, Peer Reviews and Conference Discussant Roles

- 2024 Population Association of America Applied Demography Conference, “Population Projections” session chairman. February 2024.
 - <https://events.rdmobile.com/Sessions/Details/2195280>
- 2023 Population Association of America Applied Demography Conference, “Uses of Census Data and New Analytical Approaches for Redistricting” session chairman. Annapolis, MD, February 2023.
 - <https://www.populationassociation.org/events-publications/adc>
 - DOJ Section 2 Data Requirements vs Reality and the Impact on Redistricting
 - DOJ ACS CVAP annual data file inconsistencies
 - Differences in CVAP and VAP Reported by the USCB and the Impact on Redistricting
 - Changing Multi-Race Definitions and the Impact on Redistricting
- 2020 Population Association of America “Assessing the Quality of the 2020 Census” session chairman including Census Director Ron Jarmin. Virtual meeting, May 5, 2021.
 - <https://paa2021.secure-platform.com/a/organizations/main/home>
- “The Historical Roots of Contentious Litigation Over Census Counts in the Late 20th Century”. Peer reviewer for presentation at the Hawaii International Conference on the Social Sciences, Honolulu, Hawaii, June 17-19, 2004 with David A. Swanson and Paula A. Walashek.
- 2004 - Population Research and Policy Review External Peer Reviewer / MS #253 “A New Method in Local Migration and Population Estimation”.
- Session Discussant on “Spatial Demography” at the 2003 Conference of the Southern Demographic Association, Arlington, VA.
- Subject Moderator at the International Program Center (IPC) 2000 Summer Workshop on Subnational Population Projections for Planning, Suitland, MD.
- Session Chairman on “Population Estimates: New Evaluation Studies” at the 2002 Conference of the Southern Demographic Association, Austin, TX.
- Conference Session Chairman at the 2000 Conference of the Federal Forecasters Conference (FFC), Washington, DC.
- Session Discussant on “New Developments in Demographic Methods” at the 2000 Conference of the Southern Demographic Association, New Orleans, LA.
- Panel Discussant on GIS Applications in Population Estimates Review at the 2000 Conference of the Population Association of America, Los Angeles, CA.
- Panel Discussant on Careers in Applied Demography at the 2000 Conference of the Population Association of America, Los Angeles, CA.

Primary Software Competencies

ESRI ArcGIS

SAS

Microsoft Office

Professional Affiliations

American Statistical Association

Population Association of America

Southern Demographic Association

Relevant Work Experience

January 2001- April 2003 ESRI Business Information Solutions / Demographer

Responsibilities included demographic data management, small-area population forecasting, IS management and software product and specification development. Additional responsibilities included developing GIS-based models of business and population forecasting, and analysis of emerging technology and R&D / testing of new GIS and geostatistical software.

May 1998-January 2001 U.S. Census Bureau / Statistician

Responsibilities: developed and refined small area population and housing unit estimates and innovative statistical error measurement techniques in support of the Population Estimates Program and the Current Population Survey.

Service

Eagle Scout, 1988, Boy Scouts of America. Member of the National Eagle Scout Association. Involved in leadership of the Boy Scouts of America Heart of Virginia Council.



Founder: SCOVETH, Virginia Scouting and Veterans Oral History Project, in collaboration with the Virginia War Memorial →



References

Dr. David Swanson

Professional Peer

david.swanson@ucr.edu

951-534-6336

Dr. Peter Morrison

Professional Peer

petermorrison@me.com

310-266-9580